

PERSONAL

SPARKS  
weekly

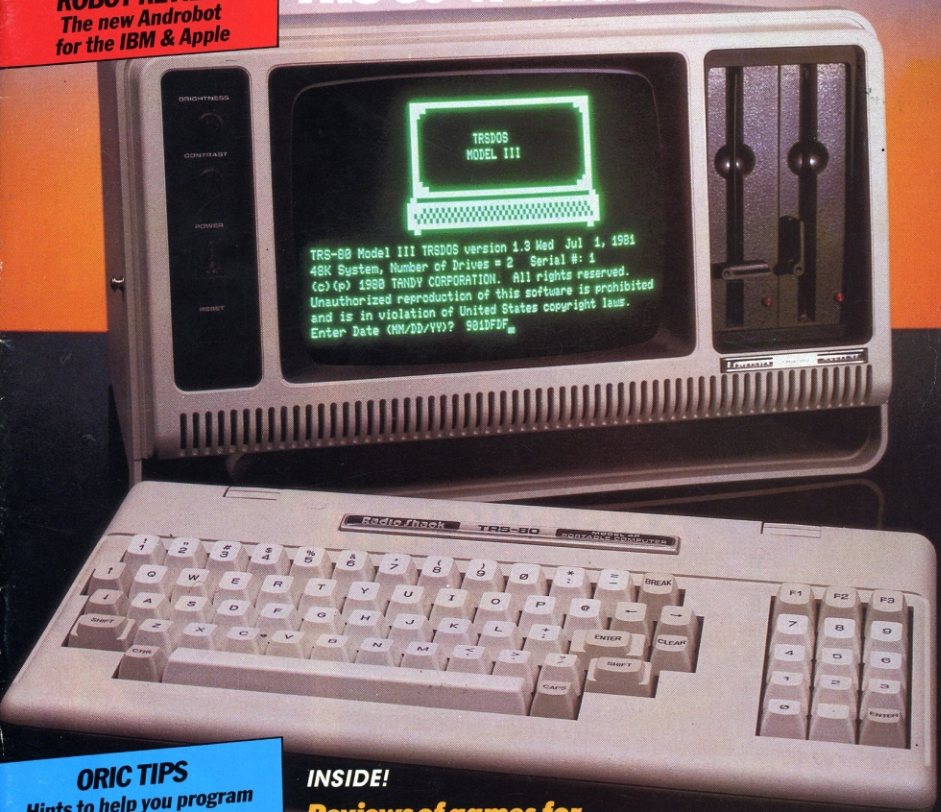
# COMPUTER

50p MAY 5, 1984 No 60 NEWS BRITAIN'S BIGGEST WEEKLY

**BBC DISK DOCTOR**  
How to solve your  
disk problems

**ROBOT REVIEW**  
The new Androbot  
for the IBM & Apple

**TANDY WORKHORSE**  
Pro-Test of the luggable  
TRS 80 4P micro



**ORIC TIPS**  
Hints to help you program

**CBM 64 PROGRAM**  
Toads, butterflies  
and a nasty habit

**INSIDE!**  
Reviews of games for  
Spectrum, Dragon, Colour Genie

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**REGULARS****Monitor 2**

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Another small sample of the vast number of micro books available, to help you make a choice.

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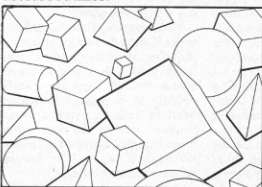
Buy, sell or swap — there is something for everyone on the second-hand bargain page.

**Quit/Datelines 64**

This is where we have a chuckle at other people's blunders — and our own.

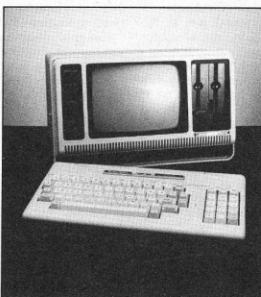
**SPECIALS****Filling in on Oric 22**

Andy Newham explains the use of Oric's FILL command and provides useful routines.

**MENU**

May 5, 1984

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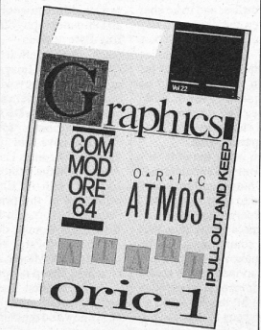
Cover photograph: Sid Hughes.

**Cover story****Tried and tested 20**

With state of the art micros making all the headlines, why buy a machine that offers only 'old-fashioned' technology? John Lettice comes up with some persuasive reasons in the form of the Tandy 4P, a luggable version of the Model 4 business system.

**MICROPAEDIA****Graphics**

Brighten up your displays, bring your graphics to life — Micropaedia will show you the arcane secrets of display lists, UDGs, Commodore MOB registers, attribute files and the other ins and outs of picture power on the Oric, Atari, and Commodore 64.

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Microwriter has produced an alternative to the qwerty keyboard and Piers Letcher investigates its viability.

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Curing ailing disks is the purpose of Disc Doctor for the BBC, as David Janda discovered.

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Microdrive software for the Spectrum is taking off. Barbra Conway looks at a contribution by Tasman called Tasword Two.

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Two absolute corkers this time — fighting off aliens in Psytron and engaging in dogfights in Red Baron.

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Take your pick from this variegated collection of adventure and arcade games.

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If you grow tired of defending Earth from aliens in Avenger, how about protecting your mate from the unfriendly Dragon Hawk?

**PROGRAMS****Commodore 64 55**

For all you back-to-nature freaks who can't seem to quite leave technology behind — try your hand at a game called Poison Toad.

# CBM aims high

By Ralph Bancroft

Commodore is set to take on Prestel in a big way by launching an interactive database to be called Compunet.

It will be shown for the first time at the Commodore Computer Show at the beginning of June.

Although the initial idea for Compunet came from Commodore, the service will be owned and managed by ADP, a leading communications company. Other manufacturers have been invited to participate.

The aim is to provide a complete range of services including telestorefront, telebanking, electronic mail, bulletin board, computer conferencing, home shopping and a 'gateway' access to other computers.

John Baxter, Commodore's

marketing manager explained the impetus behind Compunet as 'What reasons can I give to the whole family to use that computer and that modem?'

To accompany the service Commodore has manufactured its own modem for the Commodore 64. It plugs in to the user port and communicates at 1200/75 and 1200/1200 baud.

The built-in software allows communication with Prestel and other viewdata services as well as Compunet. Additional software on disk or cassette will allow user-to-user communication.

Each modem contains an encrypted security code which is essential for communication with Compunet. Not only will the code be used to control access to the database but also to cover two other

key features of Compunet—direct debiting of your bank account and piracy protection of telestorefront.

Any good or software purchased and any other charges incurred will be recovered by direct debiting.

Initially there will be an annual subscription of £25-£30. But the first year's subscription will be included in the £99.99 cost of the modem. Thereafter, it is hoped to recoup operating costs entirely by charging for specific services and earning commission on home shopping sales.

The software protection works by using the modem as a 'dongle'. Software downloaded through a security coded modem will only run if that modem is plugged into the user port. It can be copied as many times as you like but it still will require the particular modem to be

present for the software to run.

There are a total of four levels of security built in — this will be particularly important when the telebanking service gets off the ground. Commodore is currently negotiating with a major bank and hopes to be able to launch the service fairly soon.

Compunet is already operational, although not all the projected services are available. The first users will be members of ICPUG, the Commodore users group. They have been offered first use of the system because, as Mr Baxter describes it, 'we want them to try and crash the system and we want to make Compunet what the users want'.

Commodore has high hopes for Compunet. It aims to have 10,000 subscribers by September and 100,000 by July next year.

The database will only be accessible on a London telephone number — which could result in some people running up large telephone bills. There will be 120 ports (telephone lines) available initially.

## Future Tech joins PC race

If you can't beat them, join them. Future Technology Systems, the company that originally made much of the fact that its machines were not compatible with IBM, has announced an IBM PC-compatible micro.

So confident is it of the PC's compatibility that it is offering a 25 per cent refund on the purchase price if any of your PCDOS applications fails to run on it.

This is far from yet another PC clone. The PCI is one of FTS's Series 86 micros with enhancements to allow it to run IBM software. The result is a micro that runs twice as fast as the PC, has 512K RAM as standard (expandable to 768K), higher resolution graphics and larger disk capacities.

The PCI, like other Series 86 machines, can also run concurrent CP/M. FTS was one of the first companies in the world to sign up with Digital Research for version 3.1 of Concurrent which has windows and an IBM PC emulator mode.

## Solihull daze



Mastertronic's stand: cheap thrills or realistic pricing?

By David Guest

Compact, noisy, and with a tendency to run hot. No, it isn't a cheap disk unit, but the first Personal Computer Games show, held at Solihull last week.

It was compact thanks to the dimensions of the Solihull Conference Centre where the Radio 1 Music Marathon also took place over Easter—hence the noise. As for the heat, there was plenty of that on the outside as well.

The list of exhibitors read like the entrants to the League Cup before the big guns discovered it as a passport to Europe. Some of the software industry's leading lights were there in spirit only—there was an Ultimate trophy offered and ffee Bug-Byte games — and others (such as Gosh stalwarts as Virgin, Quicksilver and Imagine) not even in spirit. But they will be looking over their shoulders at some of the companies that were represented.

Mastertronic, for example, claims to have sold 100,000 copies of its £1.99 games (Issue 58) since April 1. On the adjacent stand was Imperial, with its Empires at the other end of the price spectrum. Around the corner in the Beaumont Room was Romik, demonstrating Amstrad software; and the irrepressible Jeff Minter of Llamasoft launched Sheep in Space.

Romik's Alien Break-in for the new Amstrad micro (Issue 58) is ready now and the company is going

ahead with the packaging. But when the game will start to be sold depends on deliveries of the machine; Romik's Alan Grey commented: 'It's no good if the computer's not there.' Its next title for the CPC 464 is Atom Smasher, and these are likely to be the first of many. Mr Grey predicted that the future for home micro play with machines like Amstrad's and with MSX systems, and he surprised nobody by revealing that Romik has some MSX projects in the pipeline.

The show broke the normal mould by taking place not in an Olympia-style aircraft hangar or a Barbican labyrinth but in three relatively small suites laid out in a clover leaf. Hence there were inevitable bottlenecks, and not only at the bar. Audiogenic took advantage of its position to create great interest, particularly in Alice in Wonderland. Alligata went to the trouble of hauling a racing car into the Beaumont Room to show off its new sponsorship, but its single-minded visitors showed more interest in the software. Fuller's Roy Backhouse once again braved the high temperatures and gave the now familiar bow-tie another outing.

More than 7,000 people visited the show but the crowds on Saturday weren't excessive.

What else would it be but sedate, with a Radio 1 event taking place on the other side of the partition? Pop music vied with synthetic music across the hall, and the events overlapped in places — Captain Sensible took on Atari at Pole Position, and on the door a heavily muscled youth complained in a bemoaning Birmingham accent: 'I thought Wham were here today.'

## COMMENT

## IBM steps into the breach

By Bryan Skinner

A joint venture involving IBM and the Hampshire Education Committee puts into sharp focus the shortcomings of Government policy on micro education.

IBM is to provide over £170,000 worth of hard- and software for English schools and colleges. The move is the first stage of a two-year pilot scheme run jointly with Hampshire Education Committee.

From September, IBM will provide 50 PCs and programs for use in Hampshire schools. IBM is also to donate £60,000 towards the cost of administering the scheme.

It has much to gain from such charity. While the stated objective is 'to help schools gain a better understanding of the uses of computers and enhance the job-related skills of youngsters', an obvious outcome will be that Hampshire pupils will get more exposure to IBM computers in particular. IBM is thus encouraging brand loyalty

and may even be looking to its future staff.

But the scheme shouldn't be condemned on those grounds. If there's one thing schools desperately lack it's hardware, and to be able to give children the chance to use and learn about IBM PCs must be a good thing. Computer studies courses are often said to be so far removed from the real world of computing that they're of little practical value. The scheme could do much to improve students' practical computing skills.

It may have other benefits: it's unlikely that other companies will ignore IBM's move, and they may be encouraged to offer equipment, software or expertise to schools.

But it seems a great pity that Government commitment to the provision of micros for schools has been seen as so inadequate that a commercial company is prepared to step in to help fill the gap. And an American company at that.



# Apple II line carries on



Stylish IIc—Apple takes a leaf out of Apricot's book.

Apple took its fightback against IBM into the portable arena last week with the launch of the stylish IIc (Issue 58).

The C stands for compact (it could also stand for CMOS—the machine uses an ultra-low power 65C02 processor and 128K of

associated RAM) and is the result of blending 1970s design with 1980s technology to make a smaller package. The RAM, however, is not battery-backed. Storage is provided by a single 5.25in floppy disk drive which makes the IIc not quite a lap-held (unless you're desperate). It is, however, eminently transportable, weighing 7.5lbs.

Features include a full-moving 63-key keyboard, 80- or 40-column display, and high-resolution colour. As with the Macintosh, there are two serial ports, one for the printer and one for a modem.

The best thing about the IIc, of course, is all the Apple II software available to run on it. In addition, 22 Apple applications have been specially enhanced (claims Apple) to

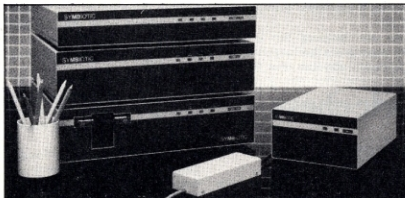
take advantage of the IIc's extra features. The 128K of memory has enabled the program adaptations to include more functions and store more menu information than the versions previously available for the earlier crop of Apples.

Software is also expected to take advantage of the Apple mouse option on the machine.

The IIc package, which includes the drive and interfaces, will cost £925. The compact monitor is priced at an additional £140. The mouse (including the package Mousepaint) is £70.

To keep its pricing structure logical Apple has been moved simultaneously to cut the price of the Apple IIe to £587. The IIe with a disk drive will now cost £795.

## IIc backers gathering



Symbiotic: turning the IIc into a family machine via comms and add-ons.

An ill-assorted gaggle of third-party suppliers cheered the IIc down the slipway last week with hardware, software and moral support.

In the van was Microsoft, in-

creasingly eager to demonstrate its commitment to Apple. Following its close involvement in the development of software for the Macintosh system Microsoft

announced the availability of the Multiplan spreadsheet for the IIc. With beguiling eccentricity it insists on referring to the machine as the Apple Lolly, perhaps in anticipation of the money it stands to make.

Other software suppliers include Systematics, Softset, Hilderbay and Ormbeta. Softset ties in with Microsoft in offering Multiplan but it adds the PFS database utilities Zaxxon, Crypto Cube, and Master-type. Systematics has adapted its entire range of business software and its managing director Mike Young declared: 'I am convinced that this time Apple has yet another winner on its hands.' The company's software is generally less prone to syntax errors than this

example of its prose suggests.

Ormbeta's Compact accounting system has been designed specifically for the IIc. Hilderbay's Family Finance and Checkpay packages reflect the descent of the IIc from earlier Apple II models by running on anything in the series.

Symbiotic Computer Systems released an interface that will let users of the IIc link it into the Symbnet network and hence to a family of storage and communications devices. The interface was produced in a period of just 36 days.

The moral support came primarily from Albion Computer Company, the hitherto little-known distributed products arm of the C Squared Group. Albion is looking into the possibility of incorporating the IIc into a briefcase along with a modem, communications software, and sandwiches.

## ACT modem gets approval

The move towards micro communications is gathering pace at ACT where the Apricot's integral modem has just been granted type-approval by the telephone-network's watchdogs.

The modem is a plug-in option that ACT doesn't intend to incorporate into the Apricot. It will cost £295 (plus VAT) and will slot into the back of the motherboard.

Approval was granted by the British Approvals Board for Telecommunications (BABT) and the British Electrotechnical Approvals Board (BEAB) in 15 and 20 weeks respectively. An ACT spokesman said it was felt that approval had been gained 'relatively briskly'.

The £295 price tag includes the cost of software to link an Apricot into ACT Micromail, the company's electronic mail service based on Telecom Gold.

## PC supplies drying up



IBM—PCs thin on the ground again.

The shortage of IBM PCs is about to become more marked.

Soon after a price cut (Issue 55) IBM was forced by component shortages to start rationing dealers to 25 machines a month. But an IBM spokeswoman admitted last

week that the position had deteriorated: 'It has worsened to some considerable extent.'

The rationing system has been altered accordingly. On the grounds that 25 machines per outlet per month was too rigid IBM has

inaugurated a new scheme which is intended to take account of the different levels of business of different dealers.

At the same time delivery schedules have gone out to eight weeks from the four that were normal between order and delivery under the earlier schedule.

The hard disk version, the PC XT, is also affected. The company is unable to say when the position might improve, but the spokesman pointed out that IBM was now licenced by Intel to produce processor chips and that this would make a difference in the long term.

Ian Fraser of the PC Users Group reported that a meeting of the group last week discussed the problem and found that it had delayed the implementation of some members' plans. But he added: 'Nobody was complaining too badly.'

## VIEW FROM JAPAN



## Japan: from the Sirius to the trivial

By Serge Powell

This was almost a View from Australia — I've been out of the country for the last couple of weeks getting a different perspective. But perspective can work in both directions and this seems like a reasonable opportunity to pull together all the bits and pieces that somehow never made it into previous columns. . . . my new computer is as good a place to start as any.

It's really just an upgrade of an upgrade of my previous model, an NEC 8800. The main reason I changed looks trivial when you consider the excitement that the remorseless advance of technology generates — my new machine has key-type scan-ahead where the old one didn't. It may not sound much but it can make a world of difference. On the old model every time I typed a word with a double letter in it (for example 'letter') it came out single ('leter'). This can be a great paper-saving device when you're using words like accommodation and committee a lot, but it looks irrelevant when 'good' repeatedly becomes 'god'.

In a similarly incongruous vein there's the second-hand trade. The expression calls to mind acres of rusting automobiles rather than the gleaming products of the white-heat of technology, but it goes on none the less. My new machine cost £720 — this bought me a CPU with 64K of RAM, separate keyboard, twin double-sided double-density 320K disk drives, and a new printer cable. The price was roughly half what I paid for its predecessor, and roughly twice what I got for the older system in a private sale.

Subsequently, through a small miracle, NEC has come out with a new, faster and enhanced version of CP/M that has made the change well worth while, and instead of the former 10 programmable function keys I now have 36. Keyboard variation can be programmed by anyone who can type — with the other I had to put in hex codes.

This leaves me happier than I was, but there is a further perspective gradually being forced on Japanese users. Slowly and uncertainly some of the machines that you presumably take for granted are beginning to appear. For example, there is to my certain knowledge at least one Sirius in Japan and probably only one. It was purchased in Hong Kong and brought back to be run and serviced at the cost of much blood, sweat and tears. The man who introduced it has now turned his attention to Apricots; he has converted a number of people who are perhaps best described as adventurers to join him in bringing them in, likewise from Hong Kong.

Whenever anyone they know is planning a trip to Hong Kong they ask him or her to buy an Apricot and return with it. Presumably this has become easier since the lighter Apricot joined the Sirius. But there is still no formal organisation here to give the handful of Apricot users any kind of maintenance safety-net and the business has an air of eccentricity. There could be the makings of an elitist piece of marketing here, with the Apricot emerging as a kind of microcomputing Rolls Royce.

Finally, back to the micro mainstream — or at least to the side of micros that is presented to people by the non-technical press, where wide-eyed enthusiasm can still run amok if left unattended. Not too long ago I visited a show called the Way of the Future. The premise was that in theory computers could soon be running half our home life; there was a demo of a system that could turn the lights on and off and open and close the curtains. These miracles of modern science occurred upon commands either from the keyboard in response to on-screen menus, or by light pens, or, if you enunciate very clearly, by voice through a microphone held about half an inch from the mouth.

The final method, I find, works equally well with my kids, and enunciation isn't as important as tone. A threatening gesture also helps but their RAM seems irremediably volatile. Perhaps, in time, I will be able to turn them into programmers and have them absorb the importance of discipline. But it seems a high price to pay to have your curtains opened and closed.

# Rair event

Rair, the UK supplier of ICL's PC, has become the first manufacturer, outside Intel itself, to build a production micro around the 80826 processor chip.

Rair is best known for its Black Box micro, the design of which was licensed by ICL for the ICL PC. It also manufactures a business computer using both 8-bit and 16-bit processor chips.

The new machine, the Supermicro, is a multiuser, multitasking system capable of handling up to 16 terminals running either Concurrent CP/M or Unix System V.

The 80826 is Intel's answer to the 68000 chip from Motorola. It uses 32-bit internal architecture and a 16-bit data bus. It also supports virtual memory operations.

Some industry watchers are suggesting that IBM might use the 80826 in its next generation of personal computers. Not only is the chip compatible with the much slower and less powerful 8088 used in the IBM PC but also IBM has built up a significant shareholding in Intel.

At the moment the chip is expensive and in short supply which may explain why Rair expects to sell



Rair's Supermicro: first to the 80826.

fewer than 1,000 Supermicros this year at a starting price of more than £10,000. Terminals cost about £600 each.

But even at this price some companies may find it an attractive proposition. With up to 16 users they could place a terminal on a desk for less than the price of an IBM PC and capable of running most IBM software at speeds in excess of that offered by much more expensive minicomputers.

In addition each terminal could run several programs at once through Concurrent CP/M and have access to up to 2Mb of RAM and 100Mb of hard disk space.

Further information: call Rair on 01-836 6921.

## Oric chess whispers

Tansoft has released a vocal version of Oric Chess. Improvements include faster response time, more options, a better level-one game and what is described as 'voice synthesis'.

According to the program notes, 'the speech can be difficult to

understand at first, and needs a fair bit of getting used-to. It is best heard in a quiet room, and needs a fair bit of concentration'.

The idea is that you could listen to the program and play the game on a board without reference to the screen. En passant moves could cause problems as these are silent, but you can use the bell to sound after a move and will know about such a move 'by the absence of sound'. This is silly enough to speak for itself — sotto voce, of course.

## Digico back on Hawk's wing

Celebrating its return, Digico has launched a range of machine from a single-user Z80 for £1,495 to a twin-processor Xenix multi-user system for £10,000.

The stricken Digico has been taken over by Centreway Industries, joining Fast Software and Hawk Computers in the Centreway stable.

The Hawk 200 is the Z80 model, while the 500 offers a 68000 CPU at a starting price of £2,695, the standard operating systems being CP/M and CP/M 68K respectively. The 600 gives Xenix, 512K plus 10Mb hard disk for £7,000, while the 700 offers a 68000 plus 8088 and will take a fairly monstrous quantity of hard disk for £13,500 upwards.



Digico — Hawk leading it out of the woods.



# Tatung splashes out

The boat was well and truly pushed out for the recent launch of the Tatung Einstein — as well it might have been. At £599 for an Apple-sized machine with a built-in 3.5in drive, the Einstein is headed straight for the BBC B market.

Tatung UK's machine is Z80-based, has Centronics, RS232, TV and monitor outputs as standard, separate sound chip, 64K available RAM plus 16K ROM, space for one extra internal disk drive and the facility to control two more. The extra internal drive costs £149, while the externals are £189.99 each. The machine also sports

something called the Tatung Pipe, which appears to be what other mortals call an expansion bus.

According to Tatung, the Einstein is being launched with 'the largest software support ever.' The machines at the press launch were mainly running Hangman and Othello, but more packages, priced from £15 for a game to £250 for serious applications, are on the way and should be here when the machine hits the shops in June.

It's also claimed that the machine can have most CP/M software ported across to it, but there's a snag. Certainly you could run

CP/M, but the Tatung is only 40-column, and will remain so until the 80-column card comes out in the autumn, leaving you in many cases with an unintelligible screen. Other peripherals, including joysticks and printers, should be out by June.

The slide show was peppered with slideswipes at the Sinclair Spectrum, but this was tame stuff compared to the dealer launch. Magnus Magnusson had hired his chair to mastermind a special episode of a well-known quiz game.

Four contestants took turns in the hot seat, and surprisingly failed to realise that the answer to every

question was the Tatung Einstein. The contest was eventually won by a computer expert from Cambridge (no, not that one) who managed a convincing impersonation of an out of work actor and took rather longer than the allotted two minutes to achieve a winning score.

To thunderous applause, lasers began to bombard the audience — clear evidence that the applause wasn't nearly thunderous enough. Magnus, however, escaped, and the survivors were regaled with a video extolling the virtues of Tatung, and telling us 'the future is now.' For users the future is June.

## NCR net links variety show

NCR's local area network (LAN), has been unveiled for owners of the NCR Decision Mate V, IBM PC and Apple II among others.

Machines running MS-DOS, CP/M-80, PC DOS 1.1/2.0 and Apple DOS 3.3 can all be interlinked on a net of 16 nodes, plus various peripherals.

To use the network, you'll need either the £13,219 NCR 6600 or £5,169 6650 file server. The former is a free-standing unit with one or two 30Mb hard disk drives, a 5¼in disk drive, two serial ports and a 20Mb tape streamer — you can upgrade this using the four communications boards. The latter is a desk top unit with a 10Mb hard disk drive, one floppy drive and a serial port.

For further information contact NCR on 01-723 7070.

## Buggies race to final flight

A cheap alternative to the £190 BBC buggy is available. For £125 you get a buggy and the Micropulse young trainer, part of a course in digital control technology.

The new buggy has two light-dependent resistors which can be programmed to follow a beam of light, or stop on reaching one. Contact Northern Computers, Churchfield Road, Frodsham,

Cheshire, 0928 35110.

As new versions of Logo and Turtle arrive, more robots and buggies are on the way. Two soon to be available for the Commodore 64 will include a version of the Zeaker II (Issue 21) for about £70. Contact IGR on 01-359 2536 for details.

We'll look at the Micropulse buggy, along with others available for the BBC, in a forthcoming issue.

## SOFTWARE

Latest releases

### Games

**BBC:** Dynabyte (0532 535401) is making much of the 'high resolution wire graphics (with hidden line removal)' in 3D Tankzone, a battlefield game with tanks and aircraft. Priced at £8.95, a version for the Electron should be available as soon as Dynabyte's programmers work out a way of making it run fast on the BBC's baby brother.

**Various:** To wit Spectrum, Commodore 64, BBC, Dragon — these can be the vehicles of Imagine's Cosmic Cruiser. Imagine (051-236 8100) added spice to the release of the game by sending a packet of Cadbury's Smash to PCN's office, where its hygroscopic properties are being tested beneath the potted plant.

**Commodore:** Valhalla from Legend (01-668 5776) will be available for the Commodore 64 from the beginning of May; the multiple award-winning game has apparently attracted £250,000 of advanced orders. It will cost £14.95. Mopul (01-7346080) has released its latest title, Fire Ant, on disk for the 64. The game demands joysticks and its cassette price will be £7.95 — no disk price has been determined yet.

**Sharp:** Star Avengers for the MZ-700 is Kuma's latest contribution to Sharp practice perfec-

tionists. It claims to be a Scramble-type game played at three times the speed, with nine scenarios. The cost is £9.95.

**Acorn:** Acornsoft's catalogue now includes Free fall, Kingdom of Hamil, Crazy Tracer, and Carousel, besides the absurd sounding JCB. All these titles cost £9.95 on tape and £11.50 on disk, either from Acorn dealers or direct from Vector Marketing in Wellingborough.

### Systems/Utilities

**Spectrum:** You can now use your Spectrum to analyse electronic circuits using Analyser from Number One systems (0480 61778).

**IBM PC:** Two new graphics packages from Fox and Geller (01-580 5816) should add colour to otherwise bland software. Fox-graph takes data from VisiCalc, SuperCalc, Lotus 1-2-3, Infostar, Wordstar and IBM Basic datafiles to turn them into a variety of graphs and charts. An upgraded version of dGraph does the same for dBase II and Friday! For graphics that make pie and bar charts look visually humdrum check out Business Graphics Interface available from P&P Micro Distributors. It allows you to save on screen pictures from any software program and read them into a 4-Point Graphics picture file.

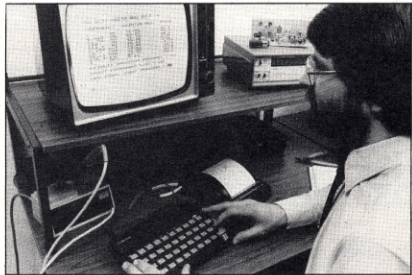
Also available from P&P is Prokey, a program that makes your keyboard fully programmable so that a key or key combination can mean whatever you want.

**Apple:** P&P's other love is the Appie and their latest import is Disewise, a program that allows you to print out large VisiCalc spreadsheets sideways on your printer.

**BBC:** SPSS is a powerful database system for mainframes and widely used in universities. Micro PSS is an attempt to bring some of its power to your Beeb. Perform cross tabulations, have five files open at once, keep files over 2Mb in length and deal with

multiple records. Further details from Educational Software Company on 051-226 1214.

**Commodore 64:** You can speed up your cassette operations and put directories on your cassette files with ACOS+, a new cassette operating system from Melbourne House (01-940 6064) which adds a total of 36 new commands to Basic. For disk users, Saxon Computing (0401 50697) has released Figaro 64 a spreadsheet and graphics package priced at £86.25. For disk or cassette users with problems, Marketing Micro Software (0473 462721) may be able to help with 64 Doctor, a hardware diagnostic program.



Analysar: the Spectrum takes on CAD.



# PCN CHARTS

# GAMES



	GAME TITLE	PUBLISHER	MACHINE	PRICE
1	1 Jet Set Willy	Software Projects	SP	£5.95
2	3 Chequered Flag	Psion	SP	£6.95
3	2 Fighter Pilot	Digital Integration	SP	£7.95
4	4 Manic Miner	S/W Projects/Bug-Byte	SP, 64	£5.95
5	9 3D Ant Attack	Quicksilva	SP	£6.95
6	11 Fred	Quicksilva	SP	£6.95
7	8 Chinese Juggler	Ocean	64	£6.90
8	7 Atic Atac	Ultimate	SP	£5.50
9	6 Hunchback	Ocean	SP, 64	£6.90
10	10 Flight	Psion	SP	£7.95
11	15 Blue Thunder	Richard Wilcox	SP	£5.95
12	13 Night Gunner	Digital Integration	SP	£7.95
13	5 Bugaboo (The Flea)	Quicksilva	SP, 64	£7.95
14	17 Wheelie	Microsphere	SP	£5.95
15	12 Rev. of Mut.C's	Llamosoft	64	£5.95
16	14 Pinball Wizard	CP Soft	64	£5.95
17	16 Lunar Jetman	Ultimate	SP	£5.50
18	18 Blogger	Alligata	64	£7.95
19	23 Space Pilot	Anirog	64	£7.95
20	28 Pogo	Ocean	SP	£5.90
21	21 Forbidden Forest	Cosmi	64	£8.95
22	20 Scuba Dive	Martech Durell	SP, 64, OR	£6.95
23	24 Super Pipeline	Taskset	64	£6.90
24	27 Snooker	Visions	SP, 64, AC, OR	£5.95
25	— The Snowman	Quicksilva	SP	£6.95
26	22 Twin Kingdom Valley	Bug-Byte	SP, 64	£9.50
27	— Trashman	New Generation	SP	£5.95
28	— Pilot 64	Abbex	64	£7.50
29	— Android II	Vortex	SP	£5.95
30	— Code Name Mat	Micromega	SP	£6.95

# MICROS

Top Ten over £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▲1	2	IBM PC	£2,390	IBM
▼2	1	ACT Sirius	£2,525	ACT
▲3	4	ACT Apricot	£1,760	ACT
▼4	3	Apple III	£2,755	APPLE
▲5	7	Wang Professional	£3,076	WANG
▼6	5	DEC Rainbow 100	£2,359	DEC
▲7	9	NCR Decision Mate V	£1,984	NCR
▼8	7	Olivetti M20	£2,180	OLIVETTI
▼9	8	Televideo TS 1603	£2,640	THORN
▲10	—	Wren	£1,150	PRISM

Top Ten up to £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶1	1	CBM 64	£200	CBM
▶2	2	Spectrum	£100	SI
▶3	3	BBC B	£400	AC
▶4	4	Vic 20	£140	CBM
▲5	7	Oric 1	£99	OR
▲6	8	Dragon 32	£175	DD
▼7	6	Electron	£199	AC
▲8	—	MTX 500	£275	MT
▼9	5	ZX81	£40	SI
▲10	—	Atari 600XL	£150	AT

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the fortnight up to April 11. The games chart is updated every other week.

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month.

PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.



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Safari	CDS	£5.80
Winged Warlords	CDS	£5.80
Magic Menaries	CDS	£5.80
Timebomb	CDS	£5.80
German/lun	CDS	£5.80
French/lun	CDS	£5.80
Ant attack	QS	£5.90
Frenzy	QS	£4.80
Fred	QS	£5.90
Astro Blaster	QS	£4.80
Cheesplayer	QS	£6.95
Space Int.	QS	£4.95
Snowman	QS	£5.90
Boogaboo	QS	£5.90
Atic Atac	ULT	£5.00
Jet Pac	ULT	£5.00
Lunar Jetman	ULT	£5.00

## COMMODORE 64

Colossus Chess	CDS	£8.80
Boogaboo Flee	QS	£6.95
Sling	QS	£6.95
Aquaplane	QS	£6.90
Ring of Power	QS	£8.90
Space Pilot	ANR	£6.90

## ORIC/ATMOS

ATMOS 48K Computer	£165.00	
ATMOS PRINTER	£145.00	
Rat Split	£6.95	
Oric Munch	TAN	£25.32
Ultima Zone	TAN	£7.95
Defence Force	TAN	£6.95
Hobbit	TAN	£12.50
Oric Base	TAN	£12.50
Oric Calc	TAN	£12.50
Languages	TAN	£10.95
Bozy Boa	CDS	£4.90

All tapes originals - not pirates

All prices INCLUDE VAT AND POSTAGE

All orders despatched by return

## EPROM PROGRAMMER for 12K ATOM and BBC B

Designed as a low cost practical solution for the serious computer hobbyist. Program supplied on tape. Plugs into Acorn bus connector on Atom and into user port on BBC machine.

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**NEW MODEL** - Will program 2716, 2532 & 2732 on 12K Atom (larger ROMs if extra memory available). Will program 2716, 2532 2732 & 2764's on BBC Model A and additionally 2712's on the Model B for 32K A with 6522 fitted).

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- 2 Copy from memory into blank
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Allows up to 13 additional ROMS to be fitted OR 16K or RAM + 5 additional ROMs. Provision also for 2 of the sockets to be used to hold 2764's and to simulate a 16K ROM. All address and data lines fully buffered.

RAM allows programs to be downloaded from disc or tape and run as a sideways ROM. Any write signal to the sideways ROM area will appear in the RAM.

Also will allow programs to be developed for subsequent insertion into sideways ROM.

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## BUTTERFLY BOARD FOR BBC

Fits into one of the sideways ROM sockets and allows a 16K program to reside in two low cost 2764's to simulate a 27128 ROM.

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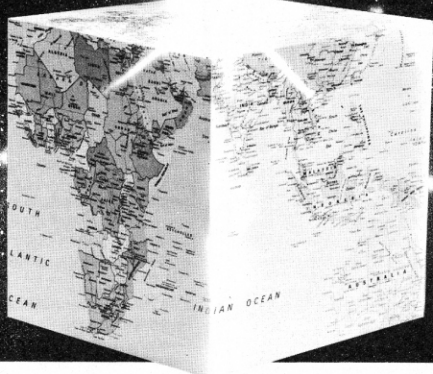
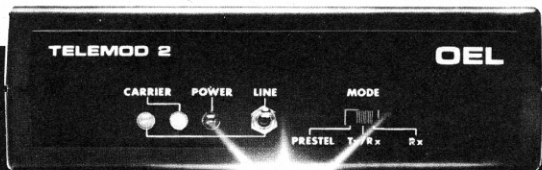
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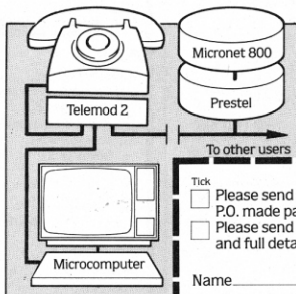
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## Piracy measures hit the merely curious

The debate about the morality/legality of tape copying continues. The points made against tapes designed specifically for copying other people's work are justified. But there are other important issues. The most important is the rights that we have over our own computers.

Like many others, I purchase commercial software, not just for games appeal but because of their quality of programming. I realise why software writers include routines to prevent illegal copying but many interested computer owners find the inability to examine, study, modify, or simply learn from software they have purchased, very frustrating.

It is in the nature of computer owners to inquire into and customise programs, and in doing so they expand their knowledge of their machine and add to their enjoyment.

I recently purchased a program which, among other features, incorporates a routine which puts me back in full control of my Spectrum. It allows me to stop Basic or machine code programs without them crashing. I've tried it on all my commercial software, and it works.

### PCN £10 Star Letter



I can now learn from my purchases without getting a black screen or a system nervous breakdown. I can now utilise all my computer's functions.

I sympathise with software houses regarding illegal copying, but I would question the right of any person to dictate that certain of the keys on my computer must remain inactive, or even 'lethal', when I use tapes I have purchased.

I have scanned the adverts for two years waiting for someone to come up with a solution, and at last they have.

Professional 'pirates' are not interested in programs like this. They use data copying machines, manufactured by well-known world-wide companies. I will not be using the program to make illegal copies, just because the save option is now open to me. It is apparent that it was not designed for such a use.

I don't defend any software designed merely to copy programs, but I would defend useful utility programs which restore my rights over my computer, and allow me to learn, not just play.

# RANDOM



# ACCESS

## Don't carry a LOAD on your shoulders, unburden yourself on PCN's letters page.

Sink the pirates but splice the mainbrace for innovative programs which restore the rights of the computer user. The machines are ours.

C. Mole,  
Burtwood, Staffs.

### No simple answer to taxing problems

As quite a few readers suffer from buying computers to use in their work and not being able to claim tax benefit, it may help if some ground rules were explained.

First, there has not been any change in the tax situation as regards this type of purchase for many years, so people can hardly claim to have hit a new snag.

If you are in salaried employment you have to show that an expense is wholly and necessarily incurred in the course of your work. If the item, in this case a computer, is kept at home wholly or part time the chances of a successful claim are nearly nil. If the item was bought merely to assist you in your work then again the chance of a claim is nearly nil.

The only chance you have of claiming after the event is under tools of trade allowance, but unless you are in a design-related post, that is doubtful.

If you are thinking of buying a computer to use in your work my advice is to first approach your employer's accounting department and have a word with the tax specialist. As most of the people involved are teachers, this is not very good advice, but there are probably parents of your pupils who have tax knowledge.

The next thing is to try and get a letter from your employer instructing you to purchase a computer as part of your work. Then approach your tax office, but do not be surprised if you still get a refusal. Remember that in the words of the tax laws, merely playing a game on

the computer will remove your chances of successful claim.

There is one successful avenue in that if you sell any software you design on the machine, when you declare the income from the software the claim will be acceptable as it is being offset against profits of trade.

Why not write to your MP or trade union? I doubt, however, if there will be any change as this has been haggled over for years, and no Chancellor has ever felt inclined to make the change as it could increase the size of the inland revenue staff by a factor of two overnight.

David D. Walton, FCMA  
Crowland, Cambs.

### Commodore 64 club starting up

We are seeking constructive suggestions about the range of services the new Club 64, for CBM 64 owners, should offer.

The club, best described as a Commodore 64 software user group, has a particular interest in hearing from users who cannot attend meetings because they live in remote parts, are disabled or because they do not have the time.

We have a library of high quality public domain programs, most of which have been checked and debugged. At present ten disks are available and each includes 10 to 15 programs which may be copied and distributed to friends, members of user groups, schools etc. We hope to add at least two disks per month and maybe issue a regular newsletter on disk.

All 64 users with disk drives are invited to use our library. For anyone who wishes only to use the library there will be no membership fee but there will be a charge of £5 per disk, which includes packing and postage to any part of the British Isles (postage to other parts of the world will be extra).

We are a non-profit making

group so don't have resources to make programs available on tape but, if demand is great enough, we will try.

Interested? Write to Brendan Conroy c/o 85 Upper Drumcondra Road, Dublin 9, Ireland.

These are home-grown programs I trust? —Ed.

### Chequing up on 'vapourware'

The article 'Buyer Beware' (Issue 55) gives useful information with regard to the legal intricacies of mail order but only touched upon the problem of extended deliveries.

I am interested in purchasing a Sinclair QL, but in view of its notorious delivery record that's as far as I've got.

What is the position as regards sending off a cheque and waiting months for goods to be despatched? Instead of the normal date would it be possible to insert 'date of despatch' or would this constitute a breach of contract?

It is right for the consumer to add, if only minimally, to a supplier's fortune while his money is tied up waiting for some 'vapourware' to materialise? I would much prefer to put my money into a deposit account until despatch is likely.

T.L. Morgan,  
Wrexham, Clwyd.

As we said, you can minimise the effect of delivery delays by ordering by credit card, not by cheque. And bear in mind, a cheque is valid only if completed — which means the date as well. —Ed.

### Everlasting death in outer space

I have discovered a bug in Zorgan's Revenge for the 48K Oric 1, which enables you to obtain endless lives.

You must choose the space mission stage with only one life remaining and then shoot down ten aliens (level 9), then a Zorgan ship containing the magic scroll appears.

You now shoot down this ship and, while the lines join to form the stone, blow yourself up.

Nicholas May  
Marldon, Paignton, Devon.

But how did you remember what you'd done when you did it without knowing you were going to do it? Pretty impressive —Ed.

Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

WRITE TO: Random Access, Personal Computer News, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

Lost in a maze of bits and bytes, trapped in a forest of errors, bugged by Basic? Whatever the problem, CALL on us. Our panel of experts is at your command.

**Write to:** Routine Inquiries, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

## Feeling cheated over MSX mix-up

**Q** Like lots of other people I would like cheap peripherals and software. That is why, in February, I purchased a supposedly MSX-compatible Spectravideo SV-328 package for £319. Now I realise that my machine is not MSX-compatible as advertised, and I feel cheated and angry because the shop assistant assured me that it was. So, at that time, did the computer press.

As this compatibility was a prerequisite of my purchase and I was, in effect, lied to to achieve a sale, could I get my money back?

*T Leuert, Northwich, Cheshire*

**A** The Spectravideos were indeed launched as MSX machines. The original advertisements were created by Spectravideo Hong Kong and some of the specifications in these ads were just plain wrong. The MSX claim was withdrawn fairly quickly, but not before a number of dealers had sold a number of machines on the basis that they were MSX.

Your dealer may in fact have lied to you. The news that the Spectravideo wasn't MSX didn't break till around January, and the dealer may just have been a little late hearing about it.

However, that doesn't affect your rights. You've quite clearly been sold something on the strength of qualities it hasn't got, therefore the dealer is obliged to give you your money back. If the dealer is reluctant to do so, just head round to your local Citizen's Advice Bureau, or contact the local council's trading standards officer.

## First steps for Spectrum Forth

**Q** I recently bought Abersoft's Forth for my Spectrum. I now need a book to help me learn the language.

Abersoft recommends 'Starting Forth' by Leon Brodie, but I'm not prepared to pay another £15 for an introductory book.

**Can you recommend other volumes?**  
*M Smith, Lincoln*

**A** 'Starting Forth' is one of the best introductory texts around, so don't dismiss it just on grounds of the price. After all, you've paid £15 for a program; maybe a book is worth just as much.

Another excellent text on Forth is 'The Complete Forth' by Alan Winfield, published by Sigma Technical Press, retail price £6.95. It's not for beginners but contains just about everything you'll ever need to know about the language.

Other books you could try are 'Exploring Forth' by Owen Bishop, published by Granada at £6.95, or 'Forth for Micros' by Steve Oakey, published by Newnes Programming Books at £6.50.

An earlier, well-illustrated book is 'Discover Forth' by Thom Hogan, published by Osborne/McGraw-Hill — also well under a tenner.

## Football fan seeks kick-off

**Q** I have been searching for some time for a computer game for the Commodore 64 such as Champions for the Dragon, Football Manager for the Spectrum or League Champions for the Vic 20. Do you know of anything of this kind?

Also, I am thinking of purchasing a Spectrum Emulator for the 64 to run Spectrum programs on my machine. How would I know, when buying Spectrum software, if I will be able to use it?

*Nik Davies, Creaton, Northants.*

**A** The only game of the type you mention that we know of is The Boss from Peaksoft, which should be available from most good software shops. Fortunately it's a good game and you shouldn't be disappointed.

That's more than we can say for the only Spectrum emulator we know of and that's through the company's advertisements. As far as we can tell there is no working version as yet. The problems begin with the fact that the two machines use different tape storage formats and don't end with the considerable obstacle

posed by the different and incompatible processors — a Z80 on the Spectrum and a 6502 on the 64.

This is not to say that it can't be done but you won't be able to buy one next week, and if you could there'd be no guarantee that all Spectrum software would be usable.

We also wonder why you'd want to run Spectrum software on your 64. The 64 is rapidly gaining in the number of good programs available and Spectrum software would not use the advanced sound and graphics facilities of the 64.

## Wading in with the bubble sorts

**Q** Please can you print a bubble sort in Basic for the Oric? I've been trying to use the machine code sort routine published in an early Oric owner magazine, but it doesn't seem to handle an array with more than 120 entries, and I can't find any listings for sorts in back issues of PCN.

*R Weaver, Corsham, Wilts.*

**A** Assuming your data are in the string array AR3 and there are NE entries, one fairly efficient version of the bubble sort goes like this:

```
100 OL=1
110 EX=0:FOR IL=1 TO NE-OL
120 IF AR3(IL)<=AR3(IL+1) THEN
150
130 TS+AR3(IL):AR3(IL)=
AR3(IL+1):AR3(IL+1)=TS
140 EX=1
150 NEXT:IF EX=0 THEN 170
160 OL=OL+1:IF OL<=NE-1
THEN 110
170 REM ALL DONE
```

Bubble sorts are horrendously slow, especially with large lists.

You will find the following modified Shell-Metzner sort a major improvement in terms of speed, and the relative efficiency of the Shell-Metzner routine increases as the number of items to be sorted grows.

```
100 M=NE
110 M=INT (M/2)
120 IF M=0 THEN GOTO 240
130 K=NE-M
140 J=1
150 I=J
160 L=I+M
170 IF AR3(I)<=AR3(L) THEN
GOTO 210
180 TS=AR3(I):AR3(I)=AR3(L):
AR3(L)=TS
190 I=I-M
200 IF I<THEN GOTO 210 ELSE
GOTO 160
210 J=J+1
220 IF J>K THEN GOTO 110
230 GOTO 150
240 REM ALL DONE
```

## Wanted — a comfortable ZX81 keyboard

**Q** I have been given a ZX81, and feel it is a good starters' machine, but the keyboard is driving me wild. I need a decent, reliable keyboard, hopefully with room to enclose the power pack and a motherboard.  
*C H Davie, Caversham Heights, Reading*

**A** Your best bet would seem to be the Memotech keyboard, which cost £34.95 and plugs directly into the ZX81. It won't take an internal power supply or a motherboard, but Memotech also produces various expansion units.

At one time it was possible to buy the range from WH Smith, but as the chain has stopped re-ordering it you'll probably have trouble finding it. If you do, phone Memotech on 0993 2977 for details of stockists.

## Speaking up for compatibility

● We have had a number of inquiries about the Currah speech system's compatibility with Spectrum games. Games which run with the Currah include the following: Lunar Jetman — Ultimate; The Birds and the Bees — Bug Byte; Moon Alert, Pogo — Ocean; Time Bomb — CDS; Las Vegas Lady — Mogul; Psi Spy — Postern; Pi Balled — Automata; Zig Zag — DK Tronics; The Island — Crys-

tal; Blade Alley — PSS; 3D Monster Chase — Romik; Megafruit, Spiders Web — Thor; Lunattack — Hewson; Mined Out — Quicksilva; Mushroom Mania — Arcadia; Grand Prix Driver — Britanna; Blastermind — Martech; Mysterious Adventures (1-10) — Digital Fantasia; Lunar Rescue — Lyversoft; Crazy Golf, Punchy, Harlequin — Mr Micro; Titanic — R & R Software.



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You can create up to 50 files on the cartridge – identified by titles of your own choice.

And when you want to display the data again, Microdrives give you lightning-fast access:

- Just 3.5 seconds to access a typical file.
  - Only 9 seconds to LOAD a typical 48K program.
- ZX Microdrives use the Spectrum's own power supply.

Your first Microdrive is connected to Interface 1 by a Microdrive lead. Then, up to 7 more Microdrives can be added using Microdrive connectors. That gives you a minimum of 680K bytes of on-line capacity.

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## MICROWAVES

More hints and tips to make programming a little easier.

### Cursor repeat controlled on Vic-20

On the Vic 20 I found that POKE 37879,n where n is a value between 1 and 255, will change the speed of the cursor repeat, 1 being the fastest and 255 being the slowest.

Joanne Wright,  
Welwyn Garden City, Herts.

### Protecting against the break-ins

After completion of a program on the Vic-20, it is sometimes desirable to disable the RUN/STOP RESTORE keys, so that other people who acquire the program cannot break into it and save it.

To disable those keys, the following statements should be typed in at the beginning of the program: POKE 37150:POKE 788,194

For example:  
10 POKE 37150,3:POKE 788,194  
20 PRINT "ANYTHING"  
30 GOTO 20

Now run the program and try to break into it.

Note that it is best to complete your program and run it to check everything is working and that there are no bugs, before entering the above lines.

Craig Authur,  
Falkirk, Stirlingshire.

### Hide 'n' seek in program lines

I have done some experimenting with my Commodore and have managed to produce a neat trick with the screen editor:

```
10 REM START
20 STOP
30 PRINT "ABC"
```

"This will stop at line 20", you will say, but this is not so, not if you do the following:

```
10 GOTO30:"
Enter this and press return. Now position the cursor after the first quote mark, then press shift/ins 8 times (ie 1 for each character GOTO30:" is 8 times). Press delete 8 times and you
```

should get 8 inverse Ts following the inverted commas. Then add 'REM start' to the end of the line and press return. LIST 10 and the listing should look like the original.

Now try RUN.  
Chris Moody,  
RAF Laarbruch,  
West Germany

If you have found any unusual, clever, neat, or just plain fascinating tricks or tips that you think may be of interest to other readers, why not send them in to Microwaves. We pay £5 for every tip printed and every month we will award £25 for the tip that we consider to be a Megawave.

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Microwaves, PCN, 62 Oxford Street, London W1A 2HG.

### A Stirling method for factorials

I was impressed by Mr Ball's elegant treatment of the factorial by machine code (Issue 56). However, a simpler method can be obtained from Stirling's equation for X!

$$x! = ((2 * \pi)^{.5}) * (x * (x + .5))^{.5} * \exp(-x)$$

Hence, a factorial program would be:

```
10 INPUT "X=":X
20 PRINT "X!="
(SOR(2*PI))*((X*(X+.5))**.5)*EXP(-X)
30 GOTO 10
H S Bluston,  
Bedford
```

### ZX — picked out at random

Playing around on my ZX Spectrum, with the RANDOMISEUSR statement, I found some rather interesting effects:

```
RANDOMISE USR 2341
.. .. 2424
.. .. 3625
.. .. 1324
.. .. 2341
```

John Oughton,  
Wodhouse Mill, Sheffield.

### Z80 registers ring up values

After reading Steve Cramer's article on Spectrum ROM routines (Issue 55), I realised that the following routine may be of some use. It allows values to be passed into the Z80 registers, from Basic, and will then execute your machine code.

P D Scott,  
Winbourne, Dorset.

```
10 CLEAR 32499
20 INPUT "BC REGISTER ? " :hbc
30 INPUT "HL REGISTER ? " :hl
40 INPUT "DE REGISTER ? " :de
50 INPUT "ACCUMULATOR ? " :a
60 INPUT "ROM ROUTINE ADDRESS ? " :rom
70 LET b=INT(bc/256):LET c=bc-(256*b)
80 LET h=INT(hl/256):LET l=hl-(256*h)
90 LET d=INT(de/256):LET e=de-(256*d)
100 LET r=INT(rom/256):LET r1=INT rom-(256*r)
110 FOR n=32500 TO 32514:READ v:POKE n,v:NEXT n:
RANDOMISE USR 32500
120 STOP
130 DATA 33,1,h,1,c,b,17,e,d,62,a,205,"1,r,h,201
```

### REM killer strikes on the Lynx

Running out of memory on the Lynx? One way to save RAM is to remove all REM statements, but in a long program this can be a tedious business. What is needed is a machine code program.

Use the monitor to enter the code for REMKILL, it is fully relocatable and can be entered from any address.

Test the code by entering a Basic program containing REMS, then issue a CALL to the address to which the code is located. All REM lines should have been deleted except those at the end.

When the code is working satisfactorily, it can be saved using the monitor command D.

Chris Cytera, Mangotsfield, Bristol.

```
0001 9F80 ;REM KILL
0002 9F80 ;
0003 9F80 ;
0004 9F80 STARTBAS EQU &61FA
0005 9F80 ENDBAS EQU &61FC
0006 9F80 REM EQU &17
0007 9F80 ORG &9F80
0008 9F80 ENT
0009 9F80 2AFA61 LD HL,(STARTBAS)
000A 9F83 54 LD D,H
000B 9F84 5D LD E,L
000C 9F85 0600 LD B,0
000D 9F87 NEXTLINE
000E 9F87 E5 PUSH HL
000F 9F88 DDE1 POP IX
0010 9F8A 7E LD A,(HL)
0011 9F8B FE80 CP &80 ;End?
0012 9F8D 2811 JR Z,EXIT
0013 9F8F DD7E06 LD A,(IX+6) ;Token
0014 9F92 DD4E05 LD C,(IX+5) ;Line
length
0015 9F95 FE17 CP REM
0016 9F97 2003 JR NZ,MOVEREST
0017 9F99 09 ADD HL,BC ;Next
0018 9F9A 18E8 JR NEXTLINE
0019 9F9C MOVEREST
001A 9F9C EDB0 LDIR
001B 9F9E 18E7 JR NEXTLINE
001C 9FA0 EXIT
001D 9FA0 22FC61 LD (ENDBAS),HL
001E 9FA3 12 LD (DE),A ;Marker
001F 9FA4 C9 RET

61FA STARTBAS
61FC ENDBAS
0017 REM
9F87 NEXTLINE
9F9C MOVEREST
9FA0 EXIT
```



# ZEAL

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Nickie Robinson reports on exclusive presentations and other club action in North Kent.

If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet*, *Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG.

# Sneak preview

Commodore's new home micro has made an exclusive British debut to warm applause from North Kent Amateur Computer Club. Members saved the cost of a flight to the Hannover Fair launch (Issue 58) when Precision's Simon Tranmer (Precision's 64 software author) gave them a sneak preview of the 264.

Though the graphics and sound impressed, they were upstaged by the verbal 'help' prompt that uses Commodore's built-in Magic Voice chip. Commodore says the micro will have 121 colours available on screen: 16 colours with 8 luminosity levels. The new machine, due in the UK in May or June, got top marks from the club—not too surprising as half the members are Commodore owners. Mr Tranmer also demonstrated a word processor

he has developed for the 264.

Another club scoop has been the demonstration of an Infra Red search and rescue system, (shown on Tomorrow's World last November). The system now in use in the North Sea oil fields can detect a body floating on the sea, and give directions to a pilot or automatically guide a craft to the rescue.

Now, members are looking forward to a meaty IBM PC vs CBM 64 discussion... no prizes for guessing which has a head start...

**Name:** The North Kent Amateur Computer Club.

**Venue:** Biggin Hill Public Library, Main Section, Church Road, Biggin Hill, Kent or Charles Darwin School, Vail Lane, Biggin Hill, Kent.

**Meetings:** First Thursday in the month at 7.30pm. Contact: David Pettet on Orpington 23505.

Clubnet features one club or user group each week. Periodically, PCN will carry the full list of clubs and user groups throughout the UK.

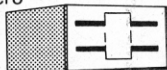


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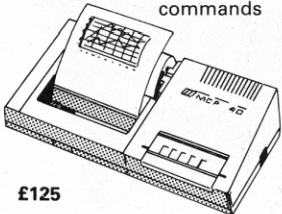
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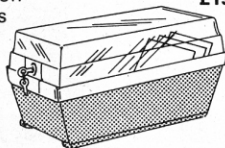
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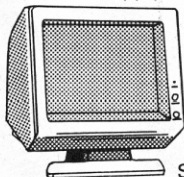
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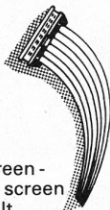
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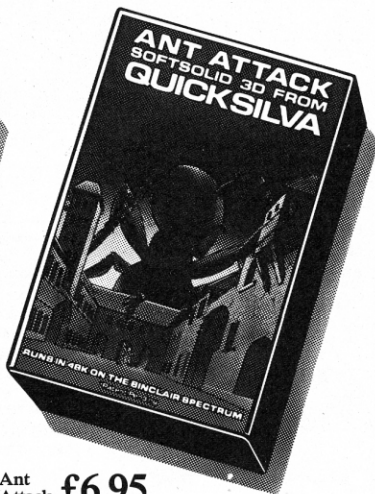


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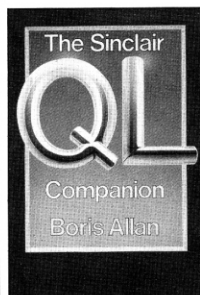
In fact, for the full spectrum, you can't do better than come to the people who know the game.

# WHSMITH



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Need some help? Or just looking for a little computer-related reading? Let us advise you.



**'The Sinclair QL Companion' by Boris Allan, published by Pitman Press at £6.95 (paperback, 113 pages).**

I approached this with a number of handicaps, not least the fact that it's tricky to review a QL book before you've seen a QL (even more difficult to write the book, no doubt).

The first 50-odd pages cover QL SuperBasic and its differences to a common or garden dialect, illustrated by a number guessing game written first in a

conspicuously witless (deliberately so, I assume) Basic version, followed by a more elegant version in SuperBasic.

Mr Allan's treatment of the BEEP command is another example of the book's thinness. 'The BEEP command is so complex that only experiment will show its true soundness', he says, pointing out that the first two parameters are the same as on the Spectrum and then hacking off a version of Frere Jacques that would happily run on the Spectrum.

The publisher's blurb on the book jacket, incidentally, claims the book covers 'the use of sound' but search for further information on BEEP and you'll search in vain, and considering it's something people will want to know, Mr Allan's 'tone deaf' alibi just won't wash.

The review of the Basic ends with a turtle graphics system then zips on into 'The MC6808; a structured chip.' There's a little specific information on the 68000 followed by a brief note that its internal architecture is the same as the 68000's. After

that it's pretty much 68000 all the way with the rear being brought up by the 68000 instruction set, 'reproduced by kind permission of Howard W Sams & Co,' publishers of 'The 68000: Principals and Programming.'

Put all this together with the disclaimer at the front:

*'The author and publishers cannot accept responsibility for any loss or other inconvenience caused by failure of the material printed in this publication to correspond to the operation of the Sinclair QL computer or of its constituent parts.'*

and you may feel it's worth waiting for a book while you wait for the QL. **IL**

**'A Beginner's Guide to the BBC Micro' by Richard and David Graves, published by Kingfisher Books at £2.50 (paperback, 72 pages).**

A father and son have teamed up to produce a simple, colourful paperback for BBC users who find other programming books hard to grasp.

This book offers an insight into what can be achieved with



the BBC. There are, of course, many books introducing programming, but in this one Richard Graves and his 11-year-old son, David, clearly appreciate the difficulties of learning to program and explain ideas in an easy-to-understand style. By the end of it you should be able to write simple programs, use number and string variables and produce sound, colour and graphics.

At £2.50, this is a valuable book for the beginner. **SG**

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# Tried &

times taken to the point where it's a disadvantage. For example, the only reference to using a non-Tandy printer simply sends you back to the Scripsit reference guide, which I naturally didn't have.

## Keyboard

The 4P has 70 keys, 15 of which—including three function keys—are accounted for by the numeric keypad on the right, while the rest are arranged in qwerty fashion, with the Control key to the left of the space bar.

The keys were a little springy for my taste, but not excessively so, and considering the complaints I get about the rattling noise from my preferred keyboard, a lot of people might find the 4P easier to use. Despite the fact that it's a transportable, the keyboard feels relatively spacious, and since it's detachable the working system takes up a lot less space on your desk than the standard Model 4.

## In use

Not being familiar with Tandys I struck out fairly early on in the game. I slavishly followed the instructions for loading an applications program—Scripsit was the one I had—and was baulked every time by 'Error 24', followed by a TRSDOS Ready prompt. Several hours later I accidentally discovered that typing SCRIPSIT seemed to do the trick. Error 24 is apparently paying attention to Error 24.

The next reef I ran into was getting anything useful out of Scripsit. The program claimed 'Press Control H for Help', when it actually meant 'aH'. This gave me more hours gnawing pensively at the corner of the keyboard before the local Tandy store put me out of my misery. Apparently, the use of a rather than Control is to maintain downward compatibility—future versions of Scripsit will have the Control key implemented.

An amended version of Scripsit implementing Control and the function keys arrived shortly after I'd got used to dealing with a.

The final problem was just plain bizarre. I tried my first printout with a Smith Corona TP1. This had already given me problems with a Tandy Model 100, so I didn't expect great success. However, it worked—with one slight drawback. The 4P didn't seem to like printing spaces between the words. Switching printer drivers (Scripsit has a number, although all for Tandy printers) didn't make any difference, and the problem remained even on an Epson. Spaces between words were possible here, but only in condensed mode, or with the margins badly messed up.

So it was back to Tandy where, after some rummaging, an Epson printer driver was found. There is, apparently, little demand for this. The main custom for the Model 4 will be business, so programs such

**W**hile Apple, IBM and Sinclair hog the headlines with state of the art (or in the case of the latter, state of the parts) products, it's easy to forget that there's a real world out there: people still buy tried and tested products that will do a job of work for them.

The Model 100 lap portable aside, Tandy is one of the main exponents of the micro as workhorse, and its latest product, the TRS 80 Model 4P, is a transportable version of the Model 4. It runs a Z80 CPU, has a built-in 9in screen and twin 187K 5.25in drives. When faced with the Macintosh at around £1,800 and the Wren, complete with bundled software, at £1,000, you'd surely want your head examined to spend £1,500 on a Tandy 4P. Or would you?

The Model 4 isn't exactly in the forefront of technology, but that's not what it's being sold as. The philosophy behind a machine like the Tandy 4P is that it's a machine that will do its job, and will have the back-up needed to keep it up and running. Provided it makes the grade in these two departments, the price looks more credible.

## Presentation

Our review model came without packaging, but seemed secure enough on its own. It's basically a console with twin 5.25in drives house upright to the right of the screen (typical of a right-handed world). The keyboard is attached to the main console by a cable and slots away under the screen and drives.

Round the back of the unit there's the power input and parallel and RS232 interfaces, which can be covered by a snap-down hatch. To pack it up you simply close the hatch, clip the cover over the

screen, turn it so the screen end is nearest the ground and pull out the handle at the back. The power cable can be packed away too if you've got a US style plug, but British standard plugs are too large—so tie it round your neck, I suppose.

There's space inside the lid for the quick reference guide and disks, but there's a problem with the latter because you have to bend them ever so slightly to get them in. Once packed up, it looks just like a sewing machine. It's pleasingly compact for a transportable, but at 11lb it's surprisingly heavy.

## Documentation

The review machine came with a quick-reference guide and a full manual, and we're told there's also a beginners' guide. The main manual goes into considerable depth about the Basic and provides copious information on the DOS, but it might have helped to include a section on how to start. The problem seems to be that Tandy approaches the machine's commands alphabetically rather than in a 'learning process' order, which can mean hunting through the manual to do quite simple things.

The review machine also came with a copy of Scripsit, the Tandy word processor, and the documentation here was even more extensive, including a seven-lesson tutorial suite on tape. After some initial embarrassment I learned that this was audio tape, and therefore I didn't need a cassette lead...

Both the tutorial tapes and the manual take you through a step by step guide to using Scripsit, and presuppose little prior knowledge. Unfortunately, this is some-



# tested

## PCN PRO-TEST HARDWARE

### John Lettice leaves state of the art for the Tandy 4P.

as Scripsit are likely to be used with daisywheel printers. To all intents and purposes, this lets out Epsoms, and if you've spent a considerable amount of money on the machine and software it probably makes sense to get a Tandy printer and use all of the software's capabilities.

These problems were only teething troubles, and credit must go to Tandy for its prompt attention to them, particularly as the 4P wasn't on sale at the time. Once the beast was fully operational I found that Scripsit was an effective and versatile word processor. It would take a Tandy printer or a lot of work to produce the various typefaces and formats to best advantage, but the ease with which you produce underlining etc compares favourably with many other software packages.

### Software

The 4P sports a particularly comprehensive and usable Basic, with that wealth of detail on its use in the manual. If it weren't for the odd doubt about the price you could sit and hack away for hours at a time, but really a £1,500 machine should be helping you earn, so this is where the

applications software comes in.

The Model 4P came with two systems disks, TRSDOS version 6 and a Model 3 emulator called Modella/III. It's easy to get the impression that Tandy has more operating systems than computers (come to think of it, that probably is the case) but this is really a trade off. Tandy does try to maintain compatibility between machines, so the operating systems tend to change on a gently gently basis. Other manufacturers simply bring out machines that won't run earlier software.

The new version of TRSDOS will be useful when the modified Tandy software range comes out, but currently Modella/III is something of a life-saver. Because it allows you to run software designed for earlier operating systems, you get access to a comprehensive software library. The fact that the Model 3 emulator is on disk is a sign of progress: the non-portable Model 4 has

it in ROM. The Tandy software catalogue includes a substantial number of packages specifically designed for the UK market.

All too often a UK-based business can buy a micro and the relevant software only to find that the software supplied is for the US market. Sometimes this doesn't matter, but remember that things like zip codes and postcodes take up different amounts of space.

### Verdict

As portables go, the Model 4P is compact, stylish — especially by Tandy's exotic design criteria — and eminently usable. Compare it with the generation of machines that's just reaching the shops and it looks old fashioned and over-priced, but the flip side is that state-of-the-art

machines often come with rudimentary support and little software. In this sense the Tandy store, bulging with software and support, is a great headache curer.

Of course, the 4P is transportable, marginally more so than the Osborne, but considerably less: so than the Macintosh, which doesn't even make a virtue of this feature. And with prices for second-hand Osbornes shaving the BBC B, this probably isn't a fruitful area to look for competition.

Even so, the price is a considerable stumbling block. You can pay £1,500 for a Tandy 4P, and have to shell out considerably more for applications software, or you can look at a machine like the Wren, which costs only £1,000 and comes with bundled software. The only other weight in the scales is Tandy's network of shops.

The machine itself is reliable, and if you want an absolute, sure-fire workhorse micro with lots of software and dealer support, money no object, it would probably be a good buy.

PCN

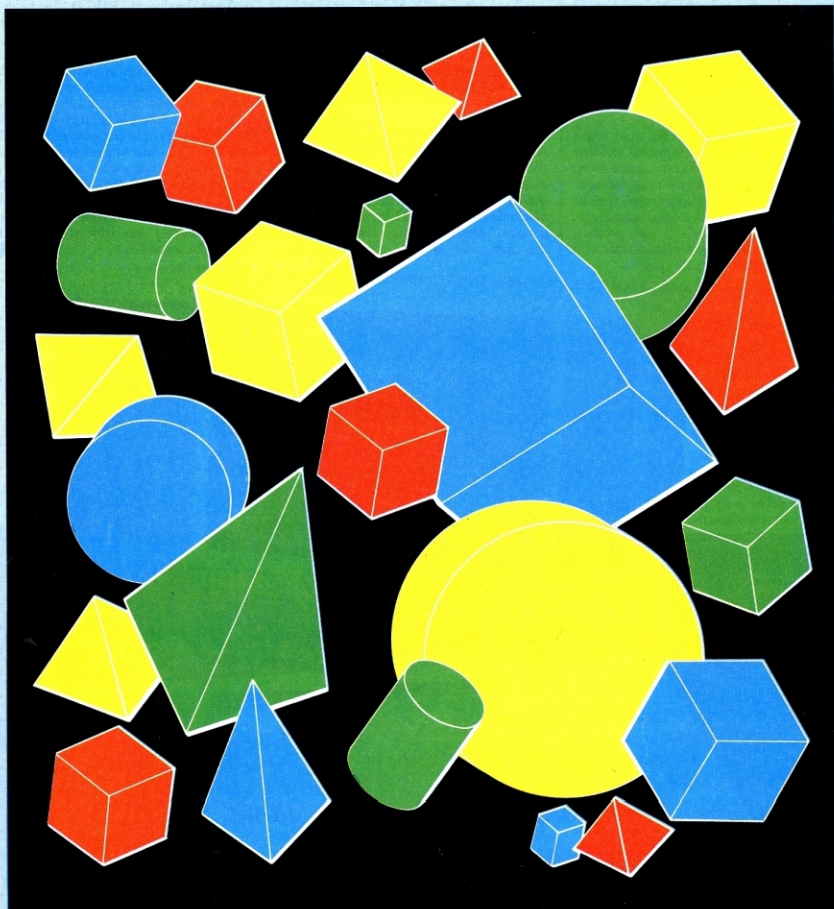


### Specifications

<b>Price</b>	£1,499 including VAT
<b>Processor</b>	Z80B running at 4MHz
<b>RAM</b>	64K expandable to 128K
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<b>Keyboard</b>	70 keys, including three function keys and 12 key numeric keypad
<b>Storage</b>	Twin 5.25in 184K drives
<b>Operating system</b>	TRSDOS 6.0, TRSDOS 1.3, LDOS, CP/M+ compatible

Andy Newham FILLS you in on the Oric shape and colour.

# Filling in on Oric



## Pattern demonstration listing

```

5 REM ***FILL MULTI-PATTERN DEMO***
6 REM ***BY A J NEWHAM***
7 REM * RUN TO SEE YOUR UNIQUE MULTI-
  COLOURED PATTERN
10 HIRES
20 FORX=@T065:FILL3,1,INT(RND(1)*7)+16:N
EXT

```

```

30 CURSET6,0,3:FORX=)TO^:FILL3,1,INT(RN
D(1)*7):NEXT
40 FORX=18T0236STEP6
50 CURSETX,0,3
60 FORY=@T065
70 FILL3,1,RND(1)*63+64+128
80 NEXT:NEXT

```



The FILL command is probably the most useful yet under-used command for use in the high resolution display on the Oric. This may be because of the inadequate explanation on page 43 of the manual. But this command can be put to a great deal of use.

POKE is used to more limited command than FILL on the high resolution screen since it can only affect a band one pixel high, and a loop is needed to fill a larger area with colour or pattern.

FILL is used to fill a band of B rows by A character cells with a value from 0 to 255 (not 127 as suggested in the manual) which produces different colours and patterns. B can range from 1 to 200 as there are 200 points down on the screen. However, A ranges from 1 to 40, as each value controls six points horizontally. This is known as a character cell.

Try typing HIRES then FILL 200,40,17 (For background take 16+ number of colour). This will fill the whole screen with red. Table 1 gives the various colours and patterns achieved by varying the last value of the FILL command.

## The FILL story

The manual doesn't tell you that, because of the serial attribute system, the proper operation of the FILL command can only be seen after you've filled the whole screen with a background attribute such as 16 (black) to prevent further background attributes from spilling over to the right. Type HIRES then FILL 200,40,16. This fills the whole screen, since HIRES sets the cursor to the top left hand corner and the FILL command covers an area 40 character cells wide and 200 pixels high.

Each time you use FILL it is wise to use CURSET beforehand to reposition the invisible cursor to the top left hand corner of the area you wish to fill.

CURSET 0,0,1:FILL 6,1,18 puts a green block in the first character cell of the first line. Increases of 1 in the Y co-ordinate of the CURSET command will move the block down the screen, but increases of 6 in the X co-ordinate are needed to move the block into new character cells to the right. CURSET 6,0,3:FILL 6,1,20 will put a blue block beside the green block, in the second character cell.

If the CURSET command was not used beforehand, the blue block would appear beneath the green block.

Squares from 6 pixels down by 1 character cell across to 198 pixels down by

The program on page 22 demonstrates how the FILL command can produce detailed and colourful patterns on the high resolution screen. These patterns can be used to colour in your pictures and show that it is possible to get more than one colour in each character cell.

Just RUN the program. The keyboard is switched off in line 10 to make the demonstration 20 per cent faster, taking 65 seconds. Line 20 fills the PAPER column with random background attributes 3 pixels high and line 30 does the same for the INK column.

You will see the effect of line 20 producing coloured stripes at first but the INK attributes do not show up. Lines 40 to 80 are the clever bit. You may notice as the pattern builds up that there are two colours per row.

These are the inverses of the INK and PAPER attributes. This is why 128 is added. The trick of the serial attribute system is that by adding 64 to a binary number from 1 to 63, the attribute is recognised as a pattern. The pattern can be designed just like one row of the letter A as on page 87 of the Oric manual.

Have fun with this program by varying the height of the patterns and attributes but remember to adjust the Y loop to 199/height. Each time you run the program a unique pattern is produced.

**Listing 1** — provides a subroutine to colour circles.

**Listing 2** — shows how to draw and fill triangles.

**Listing 3** — lets you display text and pictures on the HIRES screen.

### Listing 1

```

1 REM *** LINES 10 & 20 ARE A DEMO ***
10 HIRES
20 XCENTRE=20:YCENTRE=20:CRADIUS=10:FOR
CC=1TO7:GOSUB1000:XC=XC+30:NEXT:STOP
998 REM === LISTING 1 ===
999 REM *** CIRCLE FILL ***
1000 CURSETXCENTRE,YCENTRE,3:FORICENTRE
=1TOCRADIUS:CIRCLEICENTRE,1:NEXT
1010 CURMOV -CRADIUS-6,-CRADIUS,3:FILL2
*CRADIUS,1,CCOLOUR:RETURN
    
```

### Listing 2

```

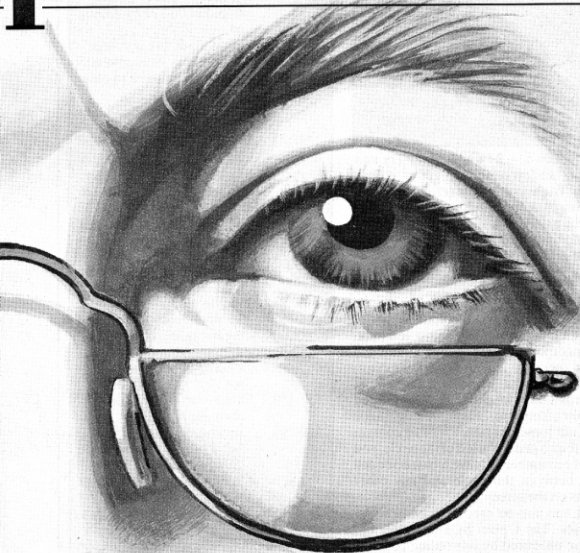
1 REM === LISTING 2 ===
5 REM ***DEMONSTRATION OF TRIANGLES ***
10 HIRES:PAPER4:INK3
20 Y1=10:FORX1=12TO234STEP6:INV=FALSE:G
OSUB2000:NEXT
30 Y1=16:FORX1=12TO234STEP6:INV=TRUE:G
OSUB2000:NEXT
39 REM *** DEMO OF LARGER TRIANGLES ***
40 INV=FALSE:S2=1:FORT2=24TO200STEP42:Y
1=90:X1=T2:GOSUB3000:S2=S2+1:NEXT:STOP
1999 REM *** SMALL ISOCELES DRAWER ***
2000 CURSETX1,Y1,3
2010 IF INV=TRUE THEN P1=192 ELSE P1=64
2020 FORI1=0TO5:P1=P1+2^I1:FILL1,1,P1:N
EXT:RETURN
2999 REM *LARGER ISOCELES TRIANGLES*
3000 GOSUB2000
3010 IFS2<?THENRETURN
3020 FORX2=1TOS2-1:X1=X1-6:Y1=Y1+6:GOSU
B2000:FORI2=1TOX2:CURMOV6,0,3
3030 FILL6,1,63:NEXTI2,X2:RETURN
    
```

Table 1

Ink/Paper Number	Colour	Inverse
0	Black	White
1	Red	Cyan
2	Green	Mauve
3	Yellow	Blue
4	Blue	Yellow
5	Mauve	Green
6	Cyan	Red
7	White	Black



# oftware from a point of view.



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Listing 3

```

1 REM ** LISTING 3 **
5 REM LINES 10-30 ARE A DEMO
10 HIRES:PRINTCHR$(27)"#"
20 REPEAT:C3=INT(RND(1)*7):B3=23-C3:X3=
RND(1)*19:Y3=RND(1)*160
30 T3$="PCN RULES":GOSUB4000:UNTILKEY$<
>"":STOP
3999 REM ** HIRES COLOURED TEXT **
4000 L3=LEN(T3$):IFX3+L3*6>220THENT3$=L
EFT$(T3$,L3-1):GOTO4000
4010 CURSETX3,Y3,3:FILLB,1,C3:CURMOV6,0
,C3:FILLB,1,B3:FORI3=1TOL3:CURMOV6,0,3
4020 CHARASC(MID$(T3$,I3,1)),0,1:NEXT:C
URMOV12,0,3:FILLB,1,16:RETURN
    
```

◀ 23 33 character cells across can be obtained by using FILL. A smaller square than 6 + 1 can be drawn using DRAW and filling the centre with more lines.

After filling the whole screen with attributes, DRAW and CURSET X,Y,1, to get points and lines respectively, do not show up, but CIRCLE does!

To avoid this, use the method below to FILL one character cell at a time and switch off the attributes for each. Also, confine your DRAWING and FILLING to separate parts of the screen.

**Method for filling one character cell at a time:**

Move the cursor to the character cell to the right of the one you want the block to be in, for example CURSET 90,100,3. Plot the black attribute first to stop spill-over (FILL 6,1,16), move the cursor over one character cell (CURMOV -6,0,3), then fill the block with the desired colour (FILL 6,0,20 for blue).

It's also possible to get four colours without having to stop spillover or having to use two character cells each time by using the INK and PAPER colours and their inverses (see Table 2).

Type HIRES: CURSET 96,0,3: FILL 6,1,6,3 (ink colour): FILL 6,1,64 (paper colour): FILL 6,1,191 (ink inverse): FILL 6,1,192 (paper inverse). Change PAPER to red and INK to white and you should get white, red, black and cyan blocks.

In order to understand how the FILL command works, we need to look at serial attributes. A serial attribute is a byte of memory sent to a character cell on the screen to control either a pattern or a colour or flashing attribute. Just like all bytes of memory, it is made up of 8 bits.

Each bit has a unique binary value to control whether it is off or on. Red background attribute, for example, uses bits 0 and 4, so you add the binary values 1 and 16 together to make 17. Both bits 5 and 6 are off, so the byte will automatically be considered as an attribute. However, if either bit 5 or bit 6 is on then the byte will be considered as a pattern. For example, a striped pattern will be produced by setting

bits 1, 3 and 5 = 2+8+32 = 42. Try FILL 200,40,42 and you should get a striped screen. To ensure that the serial attribute is read as a pattern, switch on bit 6 by adding 64 to the pattern total. If bit 7 is switched on as well, by adding 128 to 42 (=170), you should get inverse stripes. Try FILL 200, 40, 170.

### The listings

You can use FILL to colour a circle. Listing 1 is a subroutine to allow you to do this. Incorporate it into your programs and call it up, having defined XCENTRE, YCENTRE as the centre of the circle, CRADIUS and CCOLOUR. Use foreground attributes from 0 to 7.

Do not forget that since it fills a column of attributes just to the left of the circle, you should remember to leave a character cell space between the circle and any other objects on the screen.

FILL can also be used to draw isosceles triangles. The 6 pixel by 1 character cell triangle produced by subroutine 2000 can be used as a building block for larger triangles.

Set the cursor at the top left hand corner of the character cell to be filled. Use subroutine 2000 to fill in the triangles and FILL 6,1,63 to draw the squares.

Listing 2 demonstrates how to use subroutine 2000 to draw these small isosceles triangles and then uses subroutine 3000 to draw larger isosceles triangles, (S2 = the height of the triangle in character cells).

The final listing allows you to display

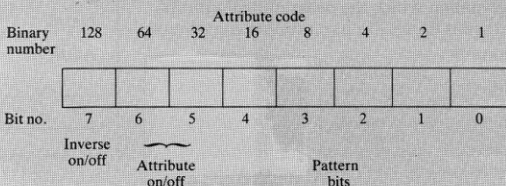
TABLE 1: Serial attributes and their functions (for use with FILL)

0-7	Foreground attributes.
8-15	Only the flashing attributes 12 to 14 work on the HIRES screen. Double height and alternate attributes do not.
16-23	Background attributes.
24-31	These affect screen synchronisation. Do not use.
32-62	Series of patterns reproduced at 96-127 by adding 64.
63	Solid block in INK colour.
64	Solid block in PAPER colour. Can be used to clear screen.
65-127	Full series of patterns, as explained in text.
128-135	A block in the inverse of the PAPER colour and a foreground attribute affecting the character to the right.
136-143	A block in the inverse of the PAPER colour and an attribute producing the same effects as the range 8-15 in the character cell to the right.
144-151	A block in the inverse of the background colour and a background attribute affecting character cells to the right.
152-159	These affect screen synchronisation.
160-190	Inverse patterns to 32-62.
191	Solid block in the inverse of the INK colour.
192	Solid block in the inverse of the PAPER colour.
193-255	Full series of inverse patterns. The bands you specify are the inverse of the foreground colour. Those left blank are in the inverse of the background colour.

coloured text along with your pictures on the HIRES screen with minimal effort. Each line of text must be carefully positioned using the X and Y co-ordinates (X3, Y3) and given a foreground and background colour (F3, B3).

However, if the text is too long, it will be shortened but still displayed. You will have to reposition it if this occurs. PCN

Diagram 1: Serial attribute



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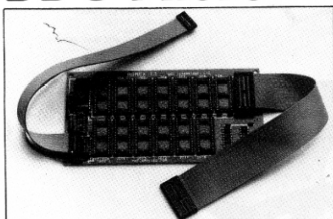
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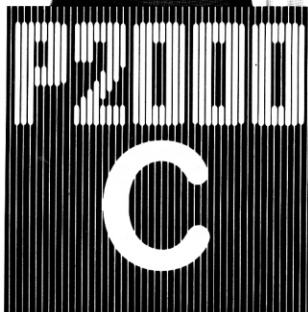
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GRAPHICS ATARI

# ATARI ANTICS



**T**he main strength of the Atari personal computers obviously lies in their graphic power and coupled with the easy to use and powerful sound capabilities, the Ataris have always been thought of more as games machines than machines for the programmer.

The Atari graphics system is based around the ANTIC chip — a separate processor almost as powerful as the 6502 which operates the whole system.

ANTIC is responsible for most of the entire control of Atari's graphics and works around a built-in program, the Display List, of instructions which ANTIC follows to build up the screen display.

The user can make up his or her own display lists to determine how a screen is displayed but the Atari operating system already has 14 of them supplied in the ROM. Thirteen of these are readily available to the XL owner through the use of the GRAPHICS command. Atari 400 and 800 owners are given nine. The remaining display lists can be obtained with a little POKEing around.

Extra registers in the other graphics chip,

GTIA, use one of these display lists to obtain three additional modes. This means that the XL owner has 16 modes predefined and the 400/800 owner has 12.

The different modes vary the size of the characters that can be displayed from  $40 \times 24$  to  $20 \times 12$ , the resolution of PLOTTing modes from  $320 \times 192$  to  $40 \times 24$  and the number of colours available in each mode. The Atari character modes are based around a full upper and lower case character set. This set includes 27 graphics characters and in the standard text mode inverse incarnations of these characters can also be obtained.

The command POKE 756,204 on one of the XL computers will place the computer into the international character set mode. In this mode the graphics characters are replaced by characters such as a £ sign and foreign letters. The GTIA chip takes the information collated by the ANTIC processor and sends it to the screen, creating the 256 colours available in the Atari.

This range of colour makes Atari graphics so good; with no other computer yet available

including this many colours. Normally through the BASIC COLOR (note American spelling) command, 16 colours can be displayed at one time on a single screen. In most modes the colours used can be chosen from 128 of the 256 colours available and they can be changed after the information has been placed on the screen.

Three modes created by GTIA from the display list can select from all 256 of the Atari's colours. Machine code programmers could even place all 256 colours onto the screen at one time. The four modes in the XL that are not readily available using the GRAPHICS command on the 400/800 range include two high resolution colour modes and two more text modes. GRAPHICS 15 will select a high resolution (160 x 192) mode with the ability to display four colours at once.

GRAPHICS 12 is a 40 x 24 text mode in which each character is the same size as those displayed in the standard display mode, mode 0. However, whereas mode 0 characters are placed on a grid of 8 x 8, characters in this mode are on a grid of 4 across by 8 down. This drop in horizontal resolution allows the Atari to display four colours within a single character, ideal for map making and screen designing. This mode has the equivalent resolution and colour capabilities of mode 15 but because a small grid of the screen is defined by a single character, this mode requires an eighth of the memory to store a screen.

Mode 13 is similar to mode 12 in the way that characters are made up but there are only 40 characters by 12 lines. The drop in vertical resolution here means that even less memory is required to store a screen, about half that of mode 12, roughly half of 1K.

Some of the more popular games use these modes to create multiple screens — as many as five of them.

The first demonstration program included here incorporates a couple of lines of mode 15 in a custom screen made out of our own display list.

The ability to control the type of display produced with the display list, as well as other display list features such as machine language display list interrupts, makes the Atari a good graphics machine. However, the Atari has other features designed to enhance the graphics.

Screen colours can be changed after information has been displayed and the character set can be re-defined to your own specifications. In fact, you can have as many character sets as memory restrictions will allow. Atari Space Invaders has four character sets that cycle through as the characters are scrolled across the screen.

The Atari also has a powerful sprite system called Player/Missile Graphics. Although only four players (full size sprites) and four missiles (quarter size sprites) are allowed, P/M graphics can be used to great effect with features such as collision detection, multiple colours where players overlap, different priority settings even after the players have been set up and independently selectable player and missile sizes.

The second program here goes through the steps necessary to set up two players. They are then both moved horizontally across the screen at different speeds.

Basic mode number	Antic Dist number	Columns	Rows	Colours	Text or graphics	Bytes per screen
0	2	40	24	2	T	960
1	6	20	24	5	T	480
2	7	20	12	5	T	240
3	8	40	24	4	G	240
4	9	80	48	2	G	480
5	10	80	48	4	G	960
6	11	160	96	2	G	1920
7	13	160	96	4	G	3840
8	15	320	192	2	G	7680
9	15	80	192	16	G	7680
10	15	80	192	9	G	7680
11	15	80	192	16	G	7680
12	4	40	24	4	T	960
13	5	40	12	4	T	480
14	12	160	192	2	G	3840
15	14	160	192	4	G	7680

```

2 REM ALTERED DISPLAY LIST BY R.HAWES
5 DIM AS(100)
10 REM MIXING GRAPHICS MODES
20 REM SELECT MODE WITH MOST MEMORY
30 GRAPHICS 15:REM (400/800 OWNERS SELECT 8)
40 REM FIND START OF D/LIST AND SET UP VARIABLES
50 DL=PEEK(560)+256*PEEK(561):IMP=65101-PEEK(561):LO=PEEK(560)
60 REM FIRST 40 LINES ARE MODE 7(ANTIC MODE 13)
70 POKE DL+3,64+14:REM FIRST LINES INCLUDES INSTRUCTION
75 REM TO READ MEMORY
80 FOR T=0 TO 39:POKE DL+4+T,14:NEXT T:REM NEXT 39 LINES
90 REM NEXT 2 LINES ARE MODE 2(ANTIC MODE 7)
100 FOR T=0 TO 1:POKE DL+45+T,7:NEXT T
110 REM NEXT 4 LINES ARE MODE 0(ANTIC MODE 2)
120 FOR T=0 TO 3:POKE DL+47+T,2:NEXT T
130 REM NEXT 2 LINES ARE MODE 1(ANTIC MODE 6)
140 FOR T=0 TO 1:POKE DL+51+T,6:NEXT T
150 REM NEXT 24 LINES ARE MODE 15(ANTIC MODE 14)
160 FOR T=0 TO 23:POKE DL+53+T,14:NEXT T
170 REM NEXT LINE IS MODE 0(ANTIC MODE 2)
180 POKE DL+77,2
190 POKE DL+78,IMP:REM LAST THREE NUMBERS TELL
200 POKE DL+79,LO:REM ANTIC WHERE TO START
210 POKE DL+80,HI:REM READING D/LIST AGAIN
220 REM DISPLAY DATA
230 COLOR 1:FOR T=0 TO 159 STEP 5
240 PLOT 0,0:DRAWTO T,39:NEXT T
250 COLOR 2:FOR T=159 TO 0 STEP -5
260 PLOT 159,39:DRAWTO T,0:NEXT T
270 SC=PEEK(88)+256*PEEK(89):REM START OF SCREEN MEMORY
280 REM EASIEST TO POKE INTERNAL VALUES OF CHARACTERS DIRECTLY INTO RAM
290 AS="" THESE LINES ARE PRINTED IN MODE 2"
300 FOR T=1 TO LEN(AS):POKE SC+1599+T,ASC(AS(T,1))-32:NEXT T
310 AS="" THE MIDDLE OF THE SCREEN HERE CONTAINS FOUR LINES OF BASIC MODE 0
(OH ANTIC MODE 2)"
320 FOR T=1 TO LEN(AS):POKE SC+1599+40+T,ASC(AS(T,1))-32:NEXT T
330 AS="" THESE TWO LINES ARE IN MODE 1"
340 FOR T=1 TO LEN(AS):POKE SC+1599+40+160+T,ASC(AS(T,1))+96:NEXT T:REM ADD 96 F
OR INVERSE
350 FOR Y=0 TO 2:FOR T=0 TO 255:POKE SC+1599+40+160+40+Y+256,T:NEXT T:NEXT Y
360 AS="" AND THIS IS THE LAST LINE - MODE 0
370 FOR T=1 TO LEN(AS):POKE SC+1599+40+160+40+960+T,ASC(AS(T,1))+96:NEXT T
    
```

```

10 REM PLAYER/MISSILE DEMO BY R.HAWES
20 GRAPHICS 0:POKE 710,0:HA=60:HB=80
30 POKE 752,1:POSITION=0,10:POKE 82,0
40 FOR T=0 TO 39:CHR$(160):NEXT T
50 TOP=PEEK(106)-8
60 BAS=TOP*256:POKE 54279,TOP
70 POKE 559,46:POKE 53277,3:POKE 53248,HA:POKE 53249,HB
80 POKE 704,60:POKE 705,84
90 FOR T=BAS+512 TO BAS+768:POKE T,0:NEXT T
100 FOR T=BAS+512+52 TO BAS+512+55:READ A:POKE T,A:NEXT T
110 FOR T=BAS+640+51 TO BAS+640+55:READ B:POKE T,B:NEXT T
120 DATA 56,116,255,102
130 DATA 252,240,255,255,102
140 HA=HA+2:HB=HB+1:POKE 53248,HA:POKE 53249,HB
150 IF HA>230 THEN HA=30
160 IF HB>230 THEN HB=30
170 GOTO 140
    
```



## 64 SPRITES

Graphics for the Commodore 64 fall into four main areas: keyboard graphics, user defined graphics, sprites and high-resolution graphics.

Keyboard graphics can be very simple, but effective. They can be used in different ways, with the keyboard in upper case, with CHR\$ codes, or POKE'd onto the screen. The codes for the graphics characters can be found in the appendix of the user manual and in more advanced books on the 64. CHR\$ codes range from 96 to 127 and 161 to 191 inclusive. The following line of Basic will put them on the screen:

```
FOR CO = 96 TO 127:PRINT CO;NEXT:FOR CO = 161 TO 191:PRINT CO;NEXT:RETURN>
```

This will display the pi symbol, and 62 graphics characters.

User defined graphics are a little more difficult than keyboard graphics. The principle of UDGs is to copy characters from ROM into an area of RAM. Having achieved this any number of the characters can be redefined and displayed on the screen. This method is widely used in games although it can be somewhat slow in Basic.

There are other problems when using UDGs. The logic on the 64 is to first turn off the interrupts. In Basic it is: POKE 56333,127

and the assembly language instruction is SEI (set interrupts).

Switch in the character generator by altering location 1 decimal. A POKE 1,51 switches in the character generator, which starts at 53248 decimal \$D000 hexadecimal.

The next step is to copy all or part of the character set into RAM. Before doing this you must decide where it will be safe and accessible. A commonly-used starting place is location 12288 decimal, \$3000 hexadecimal. The starting location can be higher in memory so you must remember that the Vic chip can only access 16K at any one time. We will use location 12288 as the start address for our copy.

The next thing to do to set up UDGs is to switch out the character generator and turn on the interrupts. This is done with POKE 56333,129 or CLI (assembly language) and to switch out the character generator, POKE 1,55. The final step is to redefine the characters in RAM and tell the Vic chip to look at the new character set. With our copy of the character set starting at 12288, we must alter location 53272 (Vic memory control register). POKE 53272,29 will look at the character set starting at location 12288. This is how the Basic code would look so far.

```
10 POKE 56,48:POKE 52,48:CLR:REM LIMIT MEMORY TO PROTECT COPY OF CHARACTER SET
20 POKE 56333,127:REM TURN OFF INTERRUPTS
30 POKE 1,51:REM SWITCH IN CHARACTER GENERATOR
40 FOR CH=0 TO 1024:REM COPY FIRST 1K OF CHARACTER SET
50 POKE 12288+CH,PEEK(53248+CH):COPY CHARACTER FROM ROM INTO RAM
60 NEXT CH:REM END COPY LOOP
70 POKE 1,55:REM SWITCH OUT CHARACTER GENERATOR
80 POKE 56333,129:REM TURN ON INTERRUPTS
90 FOR CH = 0 TO 10:REM REDEFINE 10 CHARACTERS
100 FOR BIT = 0 TO 7:REM EACH BIT OF CHARACTER
110 READ A:REM READ BIT
120 POKE 12288+BIT,A
130 NEXT BIT
140 NEXT CH:REM REDEFINE NEXT CHARACTER
150 REM *** CHARACTER DATA GOES HERE ONWARDS
```

The above program illustrates only the points discussed so far. It will not work as it lacks the data, but another short Basic program given in Listing 1 will set up UDGs

```
10 POKE53281,7:POKE53280,6:REM SET CBREEN AND BORDER COLOURS
20 POKE56,48:POKE52,48:CLR:REM LIMIT MEMORY
30 PRINT"[CLR]IBLK" PLEASE WAIT SETTING UP CHARACTERS"
40 OSUB1000:POKE53272,29:REM GET UP NEW CHARACTERS AND POINT TO NEW CHARACTER SET
50 PRINT"[CLR]"
60 POKE 53281,2:POKE 53280,7:REM SET SCREEN AND BORDER COLOURS
70 CO=54272:REM 'CO' IS DIFFERENCE BETWEEN SCREEN AND COLOUR RAM
80 FORM=18070:1923STEP40:REM LOOP FOR PLACING CHARACTER'S ON SCREEN AND MOVING
90 POKEM,0:POKEM+1,1:POKEM+2,2:POKEM+4,3
100 POKEM+CO,1:POKEM+CO+1,1:POKEM+CO+2,1:POKEM+CO+4,1
110 POKEM+40,32:POKEM+39,32:POKEM+38,32:REM ERASE LAST POSITIONS
120 FORDE=170:150:NEXT:REM DELAY LOOP
130 NEXTM:REM END OF LOOP TO MOVE CHAR'S
140 FORDE=170:200:NEXT:RUNS0:REM DELAY LOOP AND DO AGAIN
1000 POKE 56333,127:REM SWITCH OUT INTERRUPTS
1010 POKE 1,51:REM SWITCH IN CHAR. GENERATOR
1020 FORA=0:1024:REM COPY FIRST 1K OF CHARACTER SET
1030 POKE 12288+A,PEEK(53248+A)
1040 NEXTA
1050 POKE1,55:REM SWITCH OUT CHARACTER GENERATOR
1060 POKE56333,129:REM TURN INTERRUPTS ON
1070 FORCH=0:10:REM LOOP TO READ NEW CHARACTERS INTO RAM
1075 READN
1080 POKE12288+CH,N:REM ENTER NEW CHARACTER
1120 NEXTCH
1130 RETURN
1140 REM CHARACTER DATA
1150 DATA12,12,15,15,15,12,12,
1160 DATA24,126,255,255,255,126,60,60
1170 DATA48,48,240,240,240,48,48,
1180 DATA129,24,24,24,24,24,24,24
READY.
```

### LISTING 1

Line 10 sets the screen and border colours and line 20 limits the memory, so as not to overwrite the new character set. Line 40 is a branch to set up the new character set and point to it. At line 70 CO is set to the difference between screen and colour memory. The loop starting at line 80 moves the new characters (a tank) down the screen. Line 90 places the tank on the screen and line 100 colours it. The tank is erased by line 110 and line 120 is a delay loop.

The next statement on line 130 closes the loop for moving the tank and line 140 contains a delay loop before the program is re-started. Line 1000 switches off the interrupts. The character generator is switched in by line 1010 and 1020 starts the loop to read the first 1K of the character set into RAM. Line 1030 pokes the new character set into RAM, starting at location 12288, and line 1040 closes the loop.

The character generator is switched out and the interrupts turned on by lines 1050 to 1060. The loop starting at line 1070 reads the new characters into RAM. The characters redefined are @, A, B and C. The character data is in lines 1150 to 1180.



# ATMOS ART

```

825 PAPER0:INK4:A$="D
830 HIRES:INK2:CURSET
831 CHARASC(MID$(A$,X,
832 CURSET17,100,3:FOR
933 NEXT:WAIT350:HIRES:
34 INKA:CURSET60,40,1:
85 DRAW,0,1:DRAW,0,1:
6 CURMOV2,2,0:X=X-4:Y=Y
FORAT=1T059:CIRCLEC,2:
FORAT=1T060:Z=INT(RND
A=A+1:IFA=BTHENA=1:CLS
N=N+1:PRINT"PATTERN
FNK25THEND
    
```

The Atmos has two basic screen modes: Text, which you see when you turn on the machine and Hires, which has a greater resolution, so you can produce more detailed pictures.

The Text screen has 40 columns by 27 lines (0-26). You can get letters and words using PRINT, PLOT or POKE. The Atmos PRINT command has an extension which allows you to place things at a given location on the screen (PRINT@). You have to specify columns and rows, so, for instance, PRINT@ 10,3;"A" would put "A" at column 10 of row 3.

The Text screen can be used for simple pictures or games, but you're limited to 1080 'cells' or blocks. The Hires screen allows you to 'set' any of the 48,000 points (240 columns by 200 rows). Each point is called a pixel, short for picture element.

The Atmos has eight colours, and you set

background or foreground colours of the screen with PAPER and INK and a number to stipulate which colour (see table). For example, a black background is PAPER 0; to show words in green use INK 2. INK and PAPER only allow you to alter the overall screen colours. If you type in text, say a program, then use INK or PAPER commands, which alter the foreground or background colours on the whole screen, though there are simple ways to show different things in or on different colours.

The Atmos uses a system known as 'serial attributes' to determine colours of items on screen. An attribute is a numeric code which tells the Atmos which colour it should be, and the attributes are serial because each effects things to its right (on the same line), or until another attribute. Therefore, if you want something to be blue, and something else later in same row to be yellow, you have to specify the colour for each item individually.

This system saves on the memory space needed to specify the images on the screen, but it wastes screen space with individual colour instructions.

An attribute is simply a number less than 32, like any other piece of data. POKING such a number to the screen has the same effect as PRINTING an attribute.

As an example, to display randomly coloured blocks, first clear the screen and set the PAPER colour for the background, using the program line 10 CLS:PAPER 2:REM GREEN BACKGROUND.

Next you'll need program lines to determine the location of each coloured block (one for the column and one for the row) and the colour it is to be. These could be:

```

30 C=INT(RND(1)*40)+1:REM COLUMN
40 R=INT(RND(1)*27)+1:REM ROW
50 S=INT(RND(1)*8)-1:REM COLOUR (SHADE)
    
```

A single command such as 60 PLOT C,R,S puts the colour block on the screen. Making the program repeat placing the coloured blocks is simply using a FOR...NEXT loop. For ten you could add:

```

20 FOR NB = 1 TO 10
70 NEXT
    
```

Alternatively, line 20 could be REPEAT, line 70 might then be: NB=NB+1:UNTIL NB=9. It might be more useful to repeat the operations until the space bar were pressed, in which case you would alter line 70 to UNTIL KEY\$=CHR\$(32).

The Atmos's facility for user-defined functions is useful in graphics programming. For example, you could set up a random number function like this:

```

15 DEF FNR(N)=INT(RND(1)*N)+1
    
```

Now, each time you 'call' the function, you'll get a random number between 1 and whatever value you give to the variable N. Having set up FNR, the statement C=FNR(40) will give the variable C a value between 1 and 40. You could now rewrite

**Table of ASCII character attribute codes for Escape, Plot and Print.**

ESCAPE	EFFECT/ ATTRIBUTE	PLOT CHRS(n)	PRINT CHRS(n)
+			
@	BLACK INK	0	128
A	RED INK	1	129
B	GREEN INK	2	130
C	YELLOW INK	3	131
D	BLUE INK	4	132
E	MAGENTA INK	5	133
F	CYAN INK (LIGHT BLUE)	6	134
G	WHITE (BUFF) INK	7	135
H	SINGLE HEIGHT STEADY	8	136
I	STANDARD CHARACTERS		
J	ALTERNATE CHARACTER SET	9	137
K	DOUBLE HEIGHT CHARACTERS	10	138
L	ALTERNATE CHARACTER SET + DOUBLE HEIGHT	11	139
M	FLASHING CHARACTERS	12	140
N	ALTERNATE CHARACTER SET + FLASHING	13	141
O	DOUBLE HEIGHT + FLASHING	14	142
P	DOUBLE HEIGHT + ALTERNATE CHARACTERS + FLASHING	15	143
Q	BLACK PAPER	16	144
R	RED PAPER	17	145
S	GREEN PAPER	18	146
T	YELLOW PAPER	19	147
U	BLUE PAPER	20	148
V	MAGENTA PAPER	21	149
W	CYAN PAPER	22	150
X	WHITE PAPER	23	151
Y	TEXT 60 Hz	24	152
Z	TEXT 60 Hz	25	153
	TEXT 50 Hz	26	154
	TEXT 50 Hz	27	155
	GRAPHICS 60 Hz	28	156
	GRAPHICS 60 Hz	29	157
	GRAPHICS 50 Hz	30	158
	GRAPHICS 50 Hz	31	159





## ATMOS ART . . .

The program doesn't produce double-height characters properly because these must be printed twice, with the first on an even numbered screen line (unless you really want the lower half on top).

To POKE things onto the screen remember that the top-left corner of the text screen is at RAM address 48040. The last screen location is at address 49119. POKEing onto a specific screen coordinate requires maths to work out the memory address, but the Atmos will do the hard work for you. Since the screen starts at 48040 and there are 40 columns per line, the address of screen position 3,4 (column 3 or row 4), is given by  $48040 + (4 \times 40) + 3$ . That is, you add to 48040 the number of the row times 40, then add the column number.

The easiest way to do this is to use a subroutine to which you pass the values of the row and column where you want the item to be POKED, together with the value of the item.

The subroutine will be something like:

```
1000 POKE 48040+40*R+C,V:RETURN
```

Before calling the subroutine, set R to the row, C to the column and V to the value to be POKED to the screen. To have 'A' at column 20 of row 10:  $100 R=10:C=20:V=65:GOSUB 1000$

The number 65 is the ASCII code for the letter 'A'. This method POKES control codes to the screen as well.

In fact, the text screen begins at address 48000, addresses between here and 48039 are used for the status line for messages like Caps, Loading and so on, and there's no reason you shouldn't use this top line.

When you type in a program the lines don't start at the left hand edge of the screen since these are normally reserved for the INK and PAPER attributes for each line. You can PRINT in the second, by turning off the reserved mode with a PRINT CHR\$(29), but this will make the text appear in white on a black background because there's no PAPER code for any of the lines, so things appear in their 'default' colour. To get back to the normal screen, either repeat the PRINT statement, or press CTRL and the right square bracket.

Table of Ink and Paper Colours

INK OR PAPER	COLOUR	VALUES TO POKE	
		FOREGROUND	BACKGROUND
Ø	Black	Ø	16
1	Red	1	17
2	Green	2	18
3	Yellow	3	19
4	Blue	4	20
5	Magenta	5	21
6	Cyan (light blue)	6	22
7	White (buff)	7	23

TABLE OF CONTROL CODES

PRESS CONTROL AND	EFFECT	PRINT CHR\$(n)
A	COPY TEXT TO KEYBOARD BUFFER	(1)
B	(NOT KNOWN)	(2)
C	STOP PROGRAM	(3)
D	TOGGLE PRINT ITEMS TWICE ON/OFF	4
F	TOGGLE KEYCLICK ON/OFF	6
G	PING - 'BELL'	7
H	MOVE CURSOR 1 COLUMN LEFT	8
I	MOVE CURSOR 1 COLUMN RIGHT	9
J	MOVE CURSOR DOWN 1 ROW (LINE FEED)	1Ø
K	MOVE CURSOR UP 1 LINE (REVERSE LINE FEED)	11
L	CLEAR SCREEN (FORM FEED + 'HOME')	12
M	CARRIAGE RETURN + LINE FEED	13
N	CLEAR ROW	14
O	DISPLAY OFF (UNTIL RETURN PRESSED)	(15)
P	TOGGLE PRINTER ECHO ON/OFF	16
Q	TOGGLE CURSOR ON/OFF	17
S	TOGGLE VDU ENABLE ON/OFF	19
T	TOGGLE CAPS ON/OFF	2Ø
X	CLEAR LINE/KEYBOARD BUFFER	(24)
Z	?	(26)
[	START OF ESCAPE SEQUENCE (SAME AS ESC KEY)	27
]	TOGGLE PROTECTED COLUMNS ON/OFF	29
()	MOVE CURSOR TO TOP LEFT OF SCREEN (HOME)	3Ø
() NOT AVAILABLE		

Micropaedia editor: Geof Wheelwright  
 Contributors: Bryan Skinner, Richard Hawes, Kevin Bergin  
 Micropaedia design: Paul Clarkson



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Some time ago, we decided to add text printing facilities to the Dragon's Graphics Screens. Although it took 3 weeks of hard work for all five PMODES. We made the characters redefinable, but we did not call them sprites, because they are not, they're just redefinable characters. Then we decided to add some sound effects and user definable sounds. After another week or so, we had done that as well.

Next, we thought we would give the Dragon some sprites. We required multi-coloured sprites of any reasonable size or shape and we wanted to be able to move them without obliterating whatever else might be on the screen. We quite fancied being able to control sprites from the keyboard or joystick with just a single command, and we thought it would be nice to be able to fire sprites with the joystick buttons. No sprite system worth its salt would ignore collisions, we thought, so we would have to have a collision detector as well. Also, we wanted the sprites to be fast, versatile and easy to use, with lots of functions so that the control programme would know where all the sprites were, and what they were doing. Another brainwave was to include and automatic maze running feature where all the sprites chase, (or run away from) a particular sprite, so that it would be easy to write THAT kind of programme. Then we thought we would like to have easy animation, preferably looked after automatically, by the sprite handling system. Finally, just to make the whole idea totally impractical, it would have to be driven entirely from Basic, without any tedious Peeking and Poking.

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# QUINKEY NOVELTY

Piers Letcher lets himself in for a totally new experience in keyboards—Microwriter's Quinkey.

When you walk into the offices of Microwriter you notice that something's different, but it's hard to pinpoint what. After a while you realise that there are no typewriters in the office; microwriters are used instead.

The microwriter was one of the first steps towards portable micros, since it allowed you to word process anywhere. It was fairly expensive, but very convenient, and enjoyed a spate of popularity a couple of years ago.

Now it has been adapted to work as an alternative keyboard for the BBC—called the Quinkey.

The price has been cut to £50, and its advantages are numerous—touch-typing from the start, ease of use and multi-tasking. Furthermore, a Spectrum version is imminent.

## First impressions

The Quinkey is a little larger than a joystick, and fits underneath your right hand. It can sit quite comfortably on your lap, knee, table, or in your left hand, and ours came in the same drab cream colour as most peripherals—though a couple of brightly coloured models were spotted.

When you rest your hand on the Quinkey you notice that there is one more key than you have fingers. This (sixth) key is the equivalent of a control key and is pressed by your thumb when needed.

Having seen Microwriters but never used them, it was with some trepidation and a little scepticism that I sat down and laid my right hand on the Quinkey. Despite this I got the hang of it very quickly—after half an hour I could type most of the letters without thinking (or looking).

## Documentation

It is obvious how you hold the Quinkey but not how you use it. For this reason there is ample documentation, and several useful cards that give you the finger positions for the various letters, numbers and punctuation. These include memory aids to help you learn, but once you have used the Quinkey for a couple of hours you start to find that the most common letters are remembered automatically. This is made simpler because the most frequently used letters (like E and S) are the most easily reached.

## Features

Once you've used computers for some months you find that you can type quite fast, albeit with only one or two fingers. However, typists of this genre still look at the keyboard, and as a result tend to be neither as fast nor as accurate as touch typists whose feedback comes directly from the screen. The advantage of the Quinkey is that you don't need to look at it



at all—all your attention can be focused on the screen.

The Quinkey allows you to multi-task as well. Up to four can be plugged into the BBC at a time, and with one of the programs that come bundled with the Quinkey you can have four people simultaneously word processing, with the screen divided into quarters.

If you buy more than one Quinkey you also get a customised version of Acornsoft's Spooky Manor. This can be played by up to four players at once and is the first genuinely interactive adventure game that I've seen—everything you do has an effect on the game for the other players.

Other software is available with the Quinkey. A program called WP allows you to use View, Edword or Wordwise, and there are a couple of utilities/games to help you train yourself up to high-speed typing.

## In use

Each letter is formed by using a combination of the keys, and punctuation, etc is done by using the command key (the sixth). I learned very quickly and successfully used the Quinkey with View and Wordwise. I never managed to beat my typing speed, but I think I could, given time. More importantly, the Quinkey also proved to be more accurate than my average typing—you tend to look at the screen and correct as you go along, so there aren't many mistakes in the end result.

The biggest problem with the Quinkey is that, to use it best, you have to unlearn normal typing skills. The most common error I made was taking my fingers off it.

A nice feature of the keyboard is the way the signal is sent to the BBC on release of the keys rather than on depression, which avoids having to press the keys at the same time.

The Quinkey shows off its prowess best with people who have never used

keyboards. Children in particular react well to it, and when schools in Newcastle tested them the results were impressive. Most children in the 6-8 year-old age range produced up to four times the amount of written material they usually did, and this was of a high standard.

The Quinkey was used for programming as well as word processing, and this was aided on the BBC by sensible programming of the copy and cursor keys, making on-screen editing even simpler than it is with the BBC keyboard.

I also saw the Quinkey being used with the Spectrum. It uses the same programming ideas of keywords as the machine does, and because the keys are easier to use than those on the Spectrum, programming was fast. I used a prototype which was still being tested and amended, but it seemed reliable. It looks well worth waiting for.

## Verdict

The Quinkey is the implementation of a very interesting idea. But there is a vast and increasing number of keyboards on the market with which Microwriter has to compete. Most people who use the Quinkey will have to learn to use keyboards too, unless they can get away with mice, touchscreens and lightpens.

I enjoyed being able to sit back in a comfortable chair and type, and not get writing/typing cramp.

It is probable that Quinkies will be used mostly in education, where a computer can then be used by four children at once: a sensible way of sharing a resource that is still in short supply in schools. PCN

**Product** The Quinkey **Manufacturer** Microwriter, 31 Southampton Row, London WC1B5JH **Price** £49.95, £28.75 for extra keyboards **Outlet** Vector Marketing, Dennington Estate, Wellingborough, Northants, NN82RL

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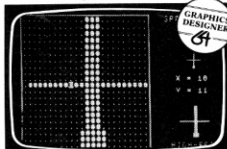
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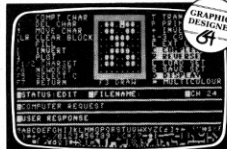
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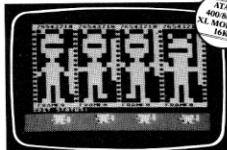
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Mike James

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192 pages £7.50

### LISP for Micros

Steve Oakey

LISP is important in artificial intelligence and robotics.

Assuming that you can already program in either BASIC or Pascal, this book starts you off with simple examples, gradually developing your expertise to the point where you can understand and use the advanced facilities of LISP. It introduces and explains programming in LISP using normal iterative methods, recursion and LISP interpreter. Finally, the book deals with program design and development in LISP.

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# Bob - a - job

Personal robots that fetch and carry could be more popular than current micros, says Steve Birchall.

While Europeans are ever more preoccupied with portables, the latest fashion in the US is mobile computers — or robots to you and me.

The most recent arrival is BOB/XA — Brains On Board/Expandable Androbot — the third in the series that started with FRED and TOPO's UK release in January. Bob is the most sophisticated of the three, combining on board computing power with Apple or IBM compatibility.

Bob, Topo and Fred are the brainchildren of Nolan Bushnell, inventor of the first video game (Pong), developer of the Atari home computer, and now the man behind Androbot Inc.

Bob resembles *Star Wars'* R2-D2 with big eyes and sloping wheels for maximum balance and mobility. It stands a little over three feet high and moves with only the gentlest whirring.

## Features

Inside is an 8088 chip, backed up by 64K of RAM, a Forth interpreter and an IBM compatible bus, so you can download the week's software into Bob. Add to this sensors, a compass, speech, a lifting mechanism and cartridge slots and you have a real robot, fit for the future.

Bob has been designed with expandability in mind, and future peripherals, like voice recognition and arms, are in the pipeline. Already you can have Bob with ultrasonic rangefinders (to stop it walking into walls), curb feelers (to stop it tripping over) and a magnetic compass.

Bob carries its own batteries, and is therefore completely independent. It is quite heavy, at 50lb, but this doesn't seem

to cause the problems with inertia/movement that you'd expect.

Its speech synthesiser is better than most, and Bob's chat is further enhanced by a vocabulary cartridge, storing 150 of the most common words. Androbot hopes to bring out a 90 per cent accurate voice recognition system in the summer to give full powers of conversation within an eight foot radius of Bob.

## Applications

What can you do with a personal robot? At the moment, virtually nothing. Bob is like an Apple before the addition of Visicalc. To make Bob useful you have to configure it with the proper sensors, lifters or circuit cards. Then you must write a program for a particular task, such as fetching a can of beer.

Androbot admits its first generation of robots is being aimed at 'robot-hackers', who will be the pioneers who discover the best applications for the machines and will write the necessary software.

Androbot hopes that eventually someone will write an application or build an accessory that will bring Bob 'to life' in the eyes of the public.

Even now Bob can perform an astonishing range of feats. He can dance (though you must lead). He can tell jokes and perform cheap card tricks. He can answer the phone and serve drinks.

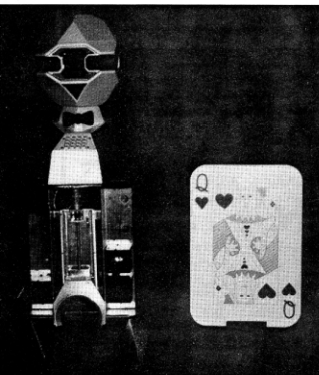
Androbot has thrown out the challenge to the high tech hobbyist. The potential

uses for Bob are as difficult to predict as they were for Apples and Sinclairs when micros first came onto the market. Those who transform Bob into a useful or entertaining product will reap the rewards — and have fun in the process.

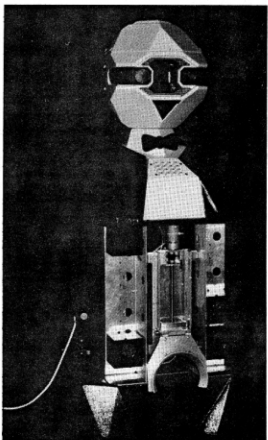
PCN

<b>Price</b>	\$2495 — Basic configuration, including 64K RAM, Motion control system, software, robot chassis. \$3995 — Advanced configuration, all of the above plus four ultrasonic sensors, retro-reflective reader, compass speech system, demo cartridge, 16-key control pad and Apple or IBM host software.
<b>Power</b>	Two 12V rechargeable batteries.
<b>Drive system</b>	Two 7in drive wheels controlled with computer feedback system.
<b>Electronics</b>	On board 8088 microprocessor, IBM compatible bus, 64K RAM (expandable to 640K), eight I/O sockets, eight 32K cartridge sockets.
<b>Software</b>	On board system control and Forth interpreter, BOB/XA diskette containing terminal program and file storage.

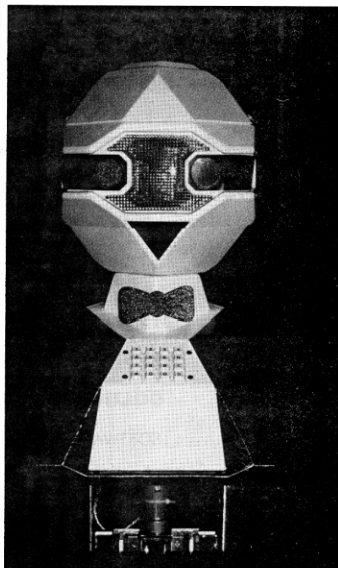
Leslie Shoemaker



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# BBC back-up

Slipped a disk? The Disc Doctor for the BBC helped cool David Janda's brow.

**D**isk trouble could be a thing of the past for BBC owners thanks to the Disc Doctor ROM. Many disk utilities may remedy such afflictions as that file you erased, or that corrupted directory.

The Disc Doctor has been updated over a couple of years: it now offers 20 utilities (see table 1), from a Zoftig Alteration Program (DZAP), to a comprehensive disassembler.

## Features

The Disc Doctor command that stands out is DZAP: it enables you to roam freely about the disk to examine the contents and change them at byte level.

One sector of the disk is displayed at a time. It's possible to move byte-by-byte, screen by screen, or to make very large jumps to other sectors and tracks.

The display indicates the track and sector, together with a Hex dump (eight bytes per line), and to the right is an ASCII dump. Two arrows indicate the current Hex byte and entering a new value automatically increments the cursor. Data can be entered in Hex, binary, decimal or ASCII, by toggling the tab key, but the display will always be in Hex/ASCII.

MZAP pretty well does the same as DZAP, except it works on memory instead. Handily, it operates in real time, so if you're looking at an area such as the system variables, you see the different locations updated before your very eyes. MZAP also has the advantage of speed: it

takes just ten seconds to get from one end of memory to the other.

Complementary to both the above commands are DSEARCH and MSEARCH, which allow you to search disk or memory for a certain string of bytes. Since this string can be entered in any of the possible bases, a search for a non-text string is possible.

It's possible to corrupt your disks so badly that whole sectors need repair. With RECOVER you can 'lift' areas of the disk into RAM, where they can be repaired and then replaced on disk with RESTORE. Both these commands are flexible; you may specify the number of sectors you work on, whereabouts in RAM—and later disk—to put them, and so on.

File manipulation is comprehensively covered. For instance, you can JOIN files into one large one; load sections of files into memory with PARTLOAD, and move them about using SHIFT and MOVE; and DOWNLOAD loads and relocates a program.

Other commands include FORM which formats disks up to 80-track. This, says the publisher, is a better formatter than the Acorn one as it formats your disks to run as fast as possible. Last, Disc Doctor allows a special directory format giving up to 60 filenames instead of the usual 31.

## Setting up

With the Eprom installed, a thorough read of the excellent manual is advisable. Each

command is discussed individually with a full explanation of how it works, and within what parameters. At the end is a description of disk formats as well as a command summary and small glossary.

## In use

Disc Doctor commands are of the \* variety, and can be accessed from most programs and languages. The commands normally require parameters to operate, and you can enter these in any base from two to 99.

Disc Doctor offers a menu catalogue facility where files are displayed with a letter. Pressing the letter activates the program, and any sub-program it uses.

In fact, Disc Doctor is not the type of software you often need. What is important is having a set of utilities available on EPROM rather than spread inconveniently over several disks. For example, an immediate fix on a file in memory is possible. This saves you dumping the memory image to disk, loading some utility from another, and then loading the damaged goods back again for repair.

Essential to any package of this type is ease of use. The last thing you want after a disk crash is to have to puzzle out how to use the utilities. Disc Doctor is quite good in this respect, but falls down badly at times. For instance, when using the disk or memory ZAPs, both text and the two small arrows which act as cursor to the Hex byte are white on black. If they were a different colour, or the byte itself was, it would be easier to see where you are. This is even more true of the ASCII display to the right, where there is no cursor.

Disc Doctor has little faults of this nature throughout. It may seem like nit-picking, but when performing fixes to files, you're going to be slightly apprehensive, and little drawbacks quickly become huge.

## Verdict

The utilities are well balanced between disk and memory routines and they work well. That they are in Eprom makes life easier all round, and for the price, you get very good value for money.

There is still room for improvement — by enhancing the existing routines and improving ease of use. This done, Disc Doctor would be far ahead of similar software, and as it is, it's got a head start already.

PCN

Table 1: DISC DOCTOR 1.09 COMMANDS

```

DIS (<sta>) (<end>) (<ofs>)
DISCTAPE <afsp> (<afsp>)...
DOWNLOAD <fsp> (<adr>)
DSEARCH <str> <trk> (<trk><sct><drv>)
DZAP (<trk>) (<trk><sct><drv>)
EDIT (<key no.>)
FIND <str>
FORM <drv> <no. trks> (<stt>) (<S>)
JOIN <fsp> <afsp> (<afsp>)...
MENU (<drv>)
MOVE (<dest page>) (<src page>)
MSEARCH <str> (<adr>)
MZAP (<adr>)
PARTLOAD <fsp> <ofs> <ext> <adr>
RECOVER <trk> <sct> <sct> <adr> <drv>
RESTORE <trk> <sct> <sct> <adr> <drv>
SHIFT <src> <dest> <ext>
SWAP (<drv>)
TAPEDISC (<fsp>)...
VERIFY (<drv>) (<no. trks>) (<stt>)
    
```

## RATING (5)

### Features

### Documentation

### Performance

### Usability

### Reliability

### Overall value



Name Disc Doctor 1.09 Application Disk/  
memory utilities System BBC micro Format  
16K Eprom Language Machine code Price TBA  
Publisher Computer Concepts, Chipperfield  
(09277) 69727 Outlets Mail order/Some  
dealers.

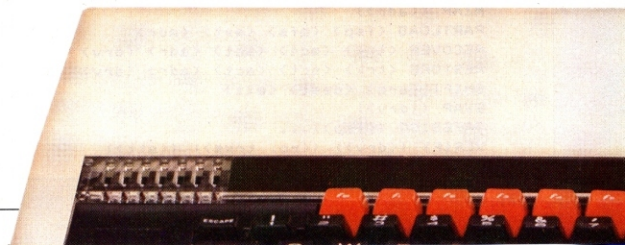




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# TASWORD TWIN

Barbra Conway achieves new levels in Spectrum word processing.



**T**he claim that almost every home micro can be used seriously is fast becoming an automatic marketing feature. Some advertisements will tell you that whichever model you are looking at, it's ideal for home or business use, a claim which often fails to stand up to close scrutiny. For any prolonged professional or semi-professional use, no computer is likely to be a real contender unless it has several special features, among which fast memory storage and access are near the top of the list.

And that automatically precludes any machine which can only store data via cassette tape.

Under the circumstances it's surprising that the Sinclair Spectrum has already managed to build up such a large element of that other essential factor — a good range of practical software including some very detailed packages for running small businesses, such as payroll programs.

The Spectrum, for all its undoubted prowess as a games and hobby machine, has traditionally had only tape storage as well as possessing a keyboard totally unsuited to regular use by anyone accustomed to a real typewriter. Even more surprising, bearing that last limitation in mind, is that one of those practical programs, Tasword Two, happens to be a word processor which, as far as features are concerned, compares happily with packages for machines much higher up the professional scale.

The program is now being adapted to make use of Sinclair's Microdrive storage system with the aim of taking it several jumps (if not a quantum leap) forward in

appeal to people who need to use a word processor regularly and store substantial documents.

The difference between trying to use an ordinary word processor on a Spectrum and using the Microdrive version is certainly dramatic. Whether it's quite enough is another matter.

## Documentation

My version came on a Microdrive cartridge, but instructions are now being given so that users with the original cassette version can transfer to cartridge using a program listing provided by Tasman Software. The documentation also includes information about using the program with either Interface 1 or the Kempston printer interface since most users are presumably going to want to use an 80-column printer for hard copy.

## In use

Once the program is on Microdrive, the standard cartridge loading procedure (NEW, then ENTER then RUN) starts loading. The advantage of the Microdrive becomes apparent immediately since the opening screen duly appears just 35 seconds later. That screen also demonstrates another way that Tasman has tried to make life easier; the display has now changed from the usual Spectrum limitations to 64 characters per line.

Tasword allows you to customise the program for your particular printer, and then to save the new configuration. Users are urged to use this version normally, saving the original as a back-up copy. Where graphics characters are concerned,

Tasword Two is particularly aimed at Epson FX80 printer owners, but those with other printers can use the 'define/graphics' facility.

Once loaded, the Tasword Tutor can be called up (under ten seconds on Microdrive) to take you through the various facilities of the program and then you're onto the Tasword Two text screen. If you are using a screen which doesn't take kindly to smaller letters, it can be adjusted to give the usual Spectrum screen display of 32 characters per line. There are 22 lines on screen at any one time, scrolling up when the screen is full, and each text file can take up to 320 lines which should be quite adequate for most home uses.

Because of the keyboard layout of the Spectrum, the control keys for the various special functions are not particularly easy to memorise. AND gives insert mode and STEP reformats text blocks, for example. But those functions are of a high standard. You have choices: whether the text wordwraps, taking the word at the end of a screen line onto the next line if it won't fit in the remaining space; manipulation of blocks of text using special markers; extensive aids to moving the cursor around the text; justification and margin setting; and the calling up of help pages on screen.

Apart from the initial loading, the main virtue of using Tasword Two on Microdrive is obviously in the saving and recalling of text files. A review of this size, for example, can be saved in well under a minute which, if you are used only to cassette systems and have never experienced disk storage, is a considerable advance.

## Verdict

The Spectrum is not primarily a word processor but if you have one and wish to do word processing on it, you could hardly do better than to use Tasword Two.

Any regular disk drive user will probably mutter angrily as the Microdrive whirrs and clicks away saving or loading text, but this is only because disk users are used to seeing such operations completed in seconds, even when long documents are involved. A graduate from cassette tape will almost certainly be delighted by the time saved. The program itself is simply excellent, exploiting the available capabilities of the Spectrum to the full. It makes you wonder what Tasman could have done writing for a machine better suited to the job.

PCN

## RATING (/5)

**Ease of use**  
**Documentation**  
**Performance**  
**Reliability**  
**Overall value**



**Name** Tasword Two **Price** £13.90 **Application** Word processing **Publisher** Tasman Software, 17 Hartley Crescent, Leeds LS6 2LL **Format** Cassette/Microdrive cartridge **Other versions** None **Outlets** Mail order

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# SPECTRUM 48K

## The final conflict

**Name** Psytron **Price** £7.95 **Publisher** Beyond, Durrant House, 8 Herbal Hill, London EC1R 5EJ, 01-837 3699. **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Retail/mail order.

Psytron is the computer responsible for the survival of the colony on Betula 5. The tasks it must perform are so complex and demanding, that you're obliged to start at level one, then build up your skills and knowledge for the next stage. If you can last an hour at level six, Beyond will give you a QL.

### Objectives

The base is under constant attack. Alien ships fly in, drop bombs or kamikaze saboteurs, and head for air locks to damage.

Survival is the watch-word; all you can hope to do is last as long as possible and minimize damage.

### In play

At level one, Droid Level, you're simply concerned with saboteurs. You can select any of the ten superb views over the installation and the planet beyond to view incoming ships. If one drops a saboteur you switch attention to other displays; the screen is divided into windows.

There's a map showing the current screen's stretch of corridor as a strip across the screen. Another window shows the

view down the corridor, curving away to right or left according to the direction your droid is facing. The A key changes the direction of the droid, Q moves it forward and the relevant windows are updated as it moves.

To reach level two you'll have to get an average score of 50% over five games. You save your 'Service Record' to tape, in order to go straight to level two.

In level three you get both levels one and two to contend with; the ships may drop bombs or saboteurs. This means you have to keep a close watch on your instruments and swap repeatedly between Skywatch and Droid modes.

At level four you have the chance to access Freetime.

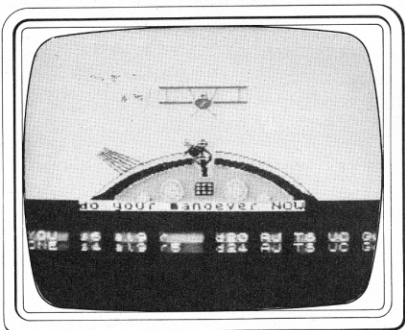
It's only at level six, the Final Conflict, that your score becomes important. The score you get depends on how well you can defend the base before you succumb. You'll be given a code based on the score to allow Beyond to judge the winner of the QL.

### Verdict

This game shows the limits of what you can do with a 48K Spectrum. It combines arcade action with cunning and strategy, forcing you to the limits of human multi-tasking. Psytron will be a very strong contender for game of the year.

#### RATING (5)

<b>Lasting appeal</b>	★★★★★
<b>Playability</b>	★★★★★
<b>Use of machine</b>	★★★★★
<b>Overall value</b>	★★★★★



## Curse you, Red Baron

**Name** Red Baron **Price** £5.95 **Publisher** M C Lothlorien, 56a Park Lane, Poynton, Stockport, Cheshire SK12 1AE **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail order, retail.

In this World War One aerial combat game you unfortunately don't play the part of Snoopy against the Red Baron; instead you are a pilot in a Sopwith Camel, and apart from avoiding Jeff Minter you must face up to either one or two German aircraft.

### Objectives

The easiest of the 19 skill levels pits you against inexperienced pilot Horst Krankel, and the hardest against the two planes of Lothar von Richtofen and his brother Manfred, the Red Baron himself. The screen shows the view from your cockpit and the purpose, of course, is to manoeuvre the enemy into your sights and make the skies free for democracy.

### In play

The cassette comes with nine pages of notes, and the game itself is a compromise between a tactical battle and a scaled-down flight simulator. Thankfully for those of us who have difficulty keeping a 747 in the air, the Sopwith Camel's controls are limited to more simple things like height and speed.

The opening menu offers five options plus Finish. The first is Enemy Aircraft Spotting, which runs through the posi-

tions of the planes seen from your cockpit. This is followed by a training flight to get you used to the controls. These are logically arranged; the left and right arrows move you 45° in either direction, up arrow is straight on, and F, S, C and D for Faster, Slower, Climb and Dive; with M for Machine-gun fire.

Another option is to choose the level of play. The first ten provide single opponents, the final nine two planes. You can also design your own game, making it easier or well-nigh impossible. Finally there's a campaign game, in which you start at level one and must go through all the levels.

You have four views from your cockpit: front, back and to either side. The instrument panel beneath shows speed, altitude and range for both you and your enemy (or enemies), as well as a 'd' for damage points; when these reach zero it's time for a plummet.

It has to be said that the game is rather a plodder, so if you demand supersonic action it's not for you. The fact that it is in Basic limits it somewhat.

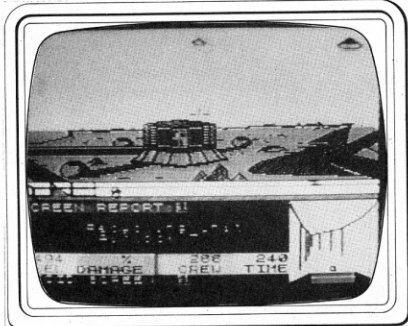
### Verdict

The graphics are limited but convincing enough, and while this isn't as good as it might have been (I'd like to have seen a machine code version with faster action and more variety in the enemy planes' position), it's still not bad if you fancy your chances of flying a Camel.

Mike Gerrard

#### RATING (5)

<b>Lasting appeal</b>	★★★★★
<b>Playability</b>	★★★★★
<b>Use of machine</b>	★★★★★
<b>Value for money</b>	★★★★★





Colour Genie owners have a fine selection to choose from, according to John Fairbairn.



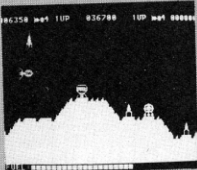
### A10 Bomber

This is an excellent version of Scramble from the newly formed Ipswich Software Factory.

Though only a few months old, ISF has proved a worthy competitor in the games market partly because of the programming expertise of Richard Hamilton, who wrote the ISF games reviewed here.

Incredibly, Richard failed O-level computer science twice before leaving school in the middle of A levels to become a full-time programmer.

A10 Bomber shows he's got little to learn about graphics and sound on the Genie. Your fighter has to pass through



seven different sets of nasties to accomplish its mission, but I haven't heard of anyone getting past level four. This challenge, plus the fact that if you lose a life you resume at the current level, not at the by-then relatively dull beginning, makes this a game worth playing again and again.

## Colour Genie in many disguises

The antique trade in computer games has begun, judging by this sextet of machine code games for the Colour Genie. But yesterday's style of game still has much to offer, especially with a bunch as good as this.

### Galactic Attack

An exercise in semi-antiquity, this game is based on Galaxian. It is unashamedly for the high-scorers and even includes the facility to freeze the game — overnight if need be. I got a rather good score but was rated a novice by the program. Someone I know got a score that looked like an Italian bank balance and was rated only Trainee Pilot.

But I rate the game highly, especially as the aliens seem to move at random and it is well programmed. It is the work of 17-year-old Gary Pallett of Microbyte, who regrettably seems to be abandoning the Genie in favour of the BBC and Electron.

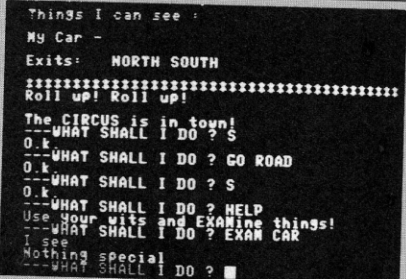


### Ten Little Indians

'I'm in a railway carriage. I can see a leather seat and a window.' That's how this game started and that's how I finished. I just couldn't get anywhere — a few duff questions and you're dead. But even the wonders of computer-based resurrection didn't enable me to get any further. In frustration I read the machine code. I now know it has an extensive but unusual vocabulary, including swear words, but I'm still stuck in that railway carriage.

I suspect I might have to read the Agatha Christie original. But do I have to? That's part of the mystery!

I'm not in a position to say if this is good value, but I know which game I'd recommend.



### Circus

This is an example of the text-only adventure games from one of the most venerable micro software houses, Molimerx (which, fittingly, is the Latin equivalent to software).

Graphics-boostered adventures are the fashion, but I think text-only will stay with us.

Circus by Brian Howarth, is one of a series of ten adventures. It was recommended as a good introduction to the latest, Ten Little Indians, and I found it a very satisfying game. It was easy to progress (or think was) but it's a long adventure and I didn't get to the end. Good value.

### Geniepede

More ISF nasties to kill but this time it's centipedes, scorpions and a lovely bouncing spider. Once again, exquisite programming makes this like the arcade Centipede.

The problem with this one is that once you've killed your centipede you start all over again, with only a colour change to denote progress.

Very good, but not likely to hold your interest unless you're

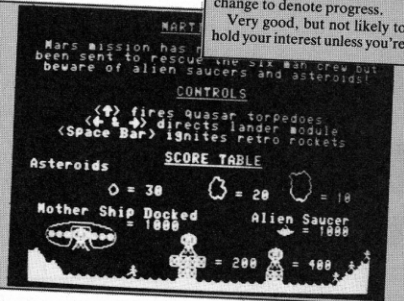


a high-score fanatic — and I found some very young players were frightened by the graphics.

### Martian Rescue

A posh version of Lunar Lander (how antique can you get?), but I'm not sure outstanding graphics and sound are enough to compensate for the simplicity of the game. In any event it's very, very hard (or there's a bug) because once your module leaves the mother ship it plummets through the asteroid belt, apparently taking no notice of the retro-rocket control.

Still a good buy, but it shouldn't be top of your shopping list.



All the games here fit in 16K. **A10 Bomber**, **Geniepede** and **Martian Rescue** (£8 + 23p postage each). Ipswich Software Factory, 27 Old Foundry Road, Ipswich IP4 2AH. **Galactic Attack** (£7.95, joysticks optional). Microbyte Software, 18 Hilgrove Road, Newquay, Cornwall. **Circus** and **Ten Little Indians** (£10.06 each). Molimerx, 1 Buckhurst Road, Town Hall Square, Bexhill-on-Sea, Sussex.

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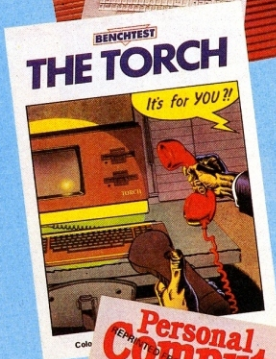
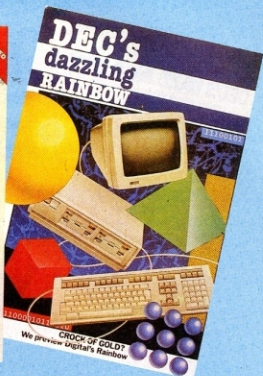
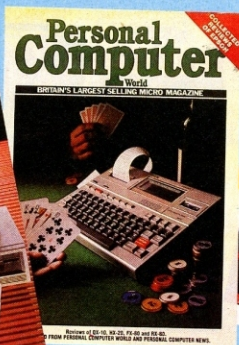
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# DRAGON

## Man in the moon

Name Avenger System Dragon 32, 1 joystick Price £5.99 Publisher Voyager Software, Business Centre, Cloughton Road, Birkenhead, Merseyside L41 6ES Format Cassette Language Machine code Other Versions None Outlets Mail order.

With a new software name for the Dragon, you never know what to expect. *Avenger* is an arcade-style game with unusual features, not least its graphics.

### Objectives

You are a freedom fighter based on the Moon and defending the Earth from the invading Marcon Empire.

### In play

You're first asked if you want to load a previously saved high-score table, or rather ten high-score tables, as each skill level has its own. You then have optional instructions explaining the three-screen game, followed by a chance to set your joystick's sensitivity on a ten-point scale. You can test each of the settings before settling for the one you prefer.

But these refinements need a decent game to go with them, so what of *Avenger*? In the first screen you gather your ammunition by landing on the green stones while avoiding orange mines. A timer ticks away, the skill level determines your number of lives and you use this section to gather

ammunition for the next part.

Here your ship faces a barrage of alien fighters. The timer ticks on and if you collide with an alien it restarts. You score for each alien you hit, this is made difficult since your direction of movement and direction of fire are linked.

The third screen gives you a chance to get more ammunition and extra lives by raiding stores at the top of the screen, avoiding aliens as you go. As you progress through the game, moving among the three screens, the aliens get tougher to beat.

The game is fast and smooth, and although the graphics are fairly simple they're more like the user-defined graphics on the Spectrum, with assorted shapes sliding about in a way you seldom see on the Dragon. It suffers from the machine's lack of colour, and the familiar sounds, but it has nice touches, such as Magic Roundabout stars Zebedee and Brian in the high score tables, and being able to make a joystick move a ship diagonally.

### Verdict

For all its virtues, though, the game soon got repetitive and didn't offer distinct challenges. Not feeling prompted to beat a particular high score, I left the Earth to the Marcons.

Mike Gerrard

### RATING (5)

Lasting appeal



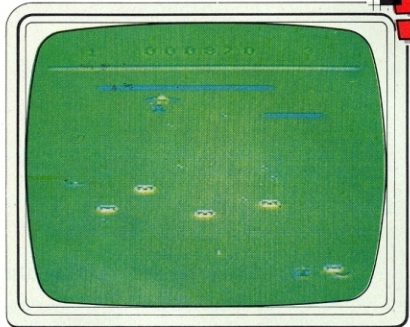
Playability



Use of machine



Overall value



## Bird watcher

Name Dragon Hawk System Dragon 32 (joystick optional) Price £8 Publisher Microdeal 0726 3456 Format Cassette Language Machine code Other versions None Outlets Retail/Mail order.

You (Wilberforce by name) have been left on duty — presumably as chief bird scarer — with the nitwit of the week, Freddy. While you do your best to kill the flying fiends, Freddy (your ever-faithful companion) stands around flapping his arms like a demented chicken.

### Objectives

Such behaviour attracts an albatross-sized hawk which plucks Freddy from the ground. It's your job to rescue him.

### In play

The left and right arrow keys move you around, the space bar fires and the down arrow gives a pause facility. There are two options open to you, kill all the flies that whizz across the screen, or hit the hawk with bullets. Your rifle fires pebble-size ammo, so you can imagine how difficult it is to wipe out the insects. Shooting the hawk is easier. If you do this (and don't kill Freddy in the process — no matter how tempting a target) Freddy will plummet earthwards.

Even with his frantic armwaving, Freddy has the aerodynamics of a brick. You now have two other choices: carry on plugging away at the birds in the hope of killing all the flies (thus saving Freddy —

even if he's inches from death) or run across the screen, drop your rifle, pick up a basket and try to save him.

Once Freddy is safe and sound, you return to your gun, he starts flapping about again and that hawk zooms in once more.

The game isn't limited to hawks, flies and Freddy though. There are embryo birds which descend to earth if you hit them. Should they touch anything on the way down, they return to their shells and soar up to the skies again. If you touch one while it's bobbing about on the ground a life is lost. You can stand on them though, if you're careful.

While you avoid the birds, kill the flies and rescue Freddy, yellow eggs drop towards you. Contact with one isn't a free breakfast, but an early death: both Freddy and Wilberforce are limited to three lives. At least death ends the incessant chirruping from roosting birds, which gets a bit irritating.

### Verdict

Though I found this a disappointing game, I did keep playing it. In fact, I couldn't stop the program, it won't take no for an answer. Pressing N to the another game Y/N didn't end the game, but merely gave you the chance to use another name.

However, if you want a fun game to encourage anti-social behaviour, this could be the one.

Jim Ballard

### RATING (5)

Lasting appeal



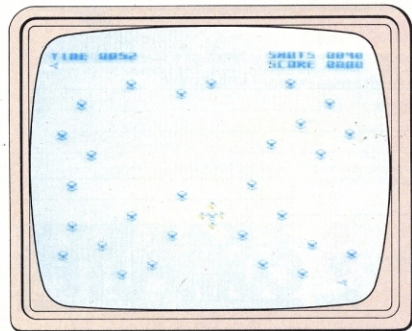
Playability



Use of machine



Overall value





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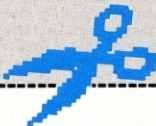
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# POISON TOAD.

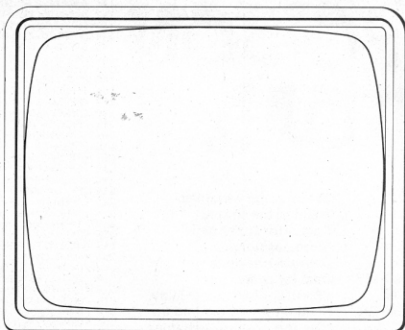
Poison Toad, from Diane Sketchley of Sawbridgeworth, Herts, is an unusual game for the Commodore 64. You take control of a butterfly and your aim, naturally, is to eat as much pollen as you can. Unfortunately, and this nearly always seems to be the case in this kind of game, there is something trying to stop you — a poisonous toad.

Toady sits on his pond and tried to knock you out of the air by spitting at you, a nasty habit of some species of toad that thankfully is not often emulated by others.

Another problem is the wind which tries to blow you away from the pollen. Fortunately you do have some control over this by pressing the X key.

All the characters in this game are sprites and this listing provides quite a good example of how to use them.

**Title:** *Poison Toad*  
**Machine:** *CBM64*  
**Language:** *CBM Basic*  
**Application:** *Game*  
**Author:** *Diane Sketchley*



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- |    |   |   |
|----|---|---|
| 2  | Gosub and print the title and instructions.                                   | 2 GOSUB9000   |
| 3  | Set up the sprite collisions  | 3 POKE53278,0:POKE53279,0:POKE53264,0   |
| 4  | Clear the screen and set the score to 0.                                      | 4 PRINT"?:SC=0:CLR  |
| 5  | Set up the screen colours.  | 5 POKE53280,9:POKE53281,9:GOSUB500  |
| 10 | Set up pointer to VIC II chip and then enable the sprites and their pointers. | 10 V=53248:POKEV+21,255:POKE2040,13:POKE2041,14   |
| 21 | More sprite pointers.   | 21 POKE2042,15:POKE2043,15:POKE2044,15:POKE2045,15:POKE2046,15:POKE2047,15  |
| 25 | Set the sprite colours.   | 25 POKEV+39,10:POKEV+40,5:POKEV+41,7:POKEV+42,7:POKEV+43,7:POKEV+44,7:POKEV+45,7  |
| 30 | Load code into the cassette buffer, this is the sprite shapes.                | POKEV+46,7<br>30 FORI=0TO190:READA:POKE532+I,A:NEXT<br>35 X=215:V=90:H=254:N=208<br>40 POKEV+1,V:POKEV,X:POKEV+2,M:POKEV+3,N<br>41 POKEV+39,7<br>42 POKEV+4,192:POKEV+5,65:POKEV+6,75:POKEV+7,75:POKEV+8,112:POKEV+9,142<br>43 POKEV+10,100:POKEV+11,200:POKEV+12,250:POKEV+13,150<br>51 POKEV+39,1:FORTH=1TOS:NEXT<br>100 DATA0,135,192,1,207,192,3,159,240,15,191,224,31,191,240<br>110 DATA63,191,224,127,127,240,255,127,192,127,127,96,63,126<br>120 DATA240,31,125,224,15,123,192,7,119,0,3,108,0,111,255<br>130 DATA128,255,255,224,111,255,128,2,144,0,4,144,0,0,72<br>140 DATA0,4,68,0,0 |



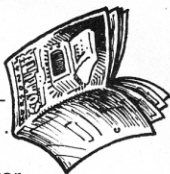




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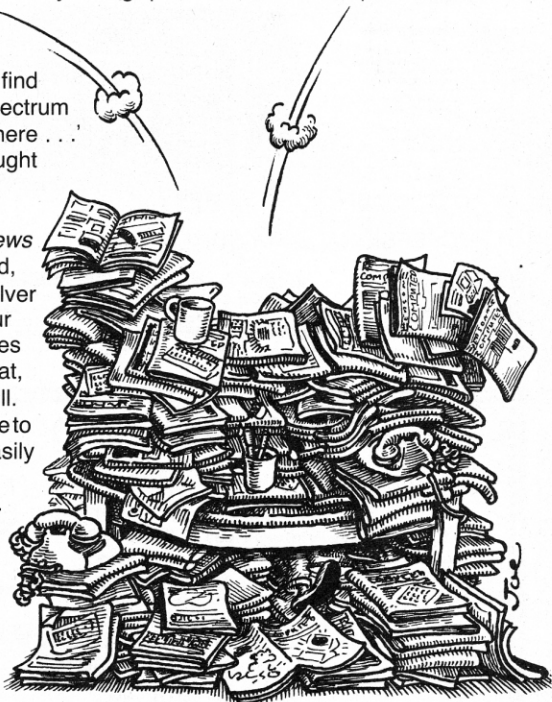
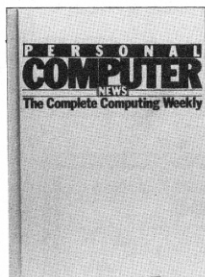
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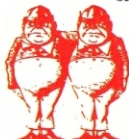
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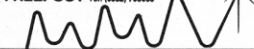
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## SLANTAX ERRORS

In Routine Inquiries (Issue 58) we provided that only Acorn's Basic II provides an extended PLOT option. In fact, since it is the 1.2 OS that provides it, this PLOT option is accessible from Basics I and II.

## NEXT WEEK

**Sordplay** Sord enters the lap-held contest with its new IS-11. **Chess craft** We review a chess program for the 64. **BBC GT** Put your foot down with this silicon disk.

## New micro launched

Congratulations to Denise Langley, of Chessington, who sent us this clipping from April 13's edition of the Surrey Comet. Denise picks up £5 in the

**VIC SPACE 20** computer complete with full instructions, cassette recorder, 50K expansion cartridge, two Joyce sticks, introduction to basic, mission impossible and £170.

PCN Misprints and Gibberish Contest. 'Who launched the Vic20 into space without telling PCN', she asks, 'and does Joyce know they're selling her sticks?'

## PCN can go to blazes . . .

Tatung has a bizarre attitude to the hardware it sends out for review.

The machine came to PCN's office accompanied by a chit saying: 'Please note that the goods on loan are for evaluation purposes only and are lent on the understanding that you undertake to destroy all work-

ing copies at the end of the loan period.'

The 'goods on loan' are described as one Tatung PC, one Tatung monitor, one Fast Purchase and one Fast Sales. What can we say? If you want a ticket to the PCN Tatung bonfire you'd best let us know. . .

## ROM — not built in a day

Spotted at the London Book Fair in Duckworth's latest catalogue: 'The Complete Sinclair QL ROM Disassembly . . . £5.95'

The price is suspiciously close to a lot of cassette games but let's assume that Duckworth isn't monkeying about. 'They must be telepathic,' said our sharp-eyed correspondent . . . but we think it's more likely that early issues of the book will have every fourth page stitched together and sold as a separate pamphlet, to be incorporated into the book at a later date.

## Sinclair: a bit on the side

By releasing its QL with appendages poking out of the back Sinclair has finally settled the argument over whether the QL is a 32-bit, 16-bit or 8/32-bit system.

The answer is none of these. It is, of course, a two-bit system. The main bit and the bit that sticks out of the back.



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## PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

## UK EVENTS

Event	Dates	Venue	Organisers
Computers, Business Systems & Communications Equipment Exhibition — MICRO CITY DEC User Show	May 15-17	Bristol Exhibition Centre Canons Road City Centre, Bristol	Tomorrow's World Exhibitions Ltd 0272 2921567 Contact David Evans 01-837 3699
Walthamssoft '84	May 15-17	Novotel Hotel, London W6	Londox 01-554 5039/3498
RIBA Computer Exhibition	May 19	Main Exhibition Hall, Waltham Forest Technical College, Forest Road, E17	RIBA Services, 01-637 8991
Apple '84	May 22-24	Bloomsbury Crest Hotel, Coram St, London WC1	Database Publications 061-456 8383
Office Automation Show	May 24-26	Fulcrum Centre, Slough	Clapp & Poliak, 01-891 5051
	June 7-9	London Barbican	

## OVERSEAS EVENTS

Event	Dates	Venue	Organisers
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